

## B.M.S. COLLEGE OF ENGINEERING BENGALURU

Autonomous institute affiliated to VTU

# SYLLABUS FOR OPEN ELECTIVE COURSES (8<sup>TH</sup> SEMESTER)



## BMS COLLEGE OF ENGINEERING, BENGALURU

Autonomous institute, affiliated to VTU

### **VISION**

Promoting Prosperity of mankind by augmenting Human Resource Capital through Quality Technical Education & Training.

### **MISSION**

Accomplish Excellence in the field of Technical Education through Education, Research and Service needs of society.

#### REGISTRATION FOR OPEN ELECTIVE

The curriculum offers THREE Open Elective Courses - VI semester, VII semester and VIII semester. These courses are open to students from all programs of Engineering.

Registration to the Open Elective happens through a transparent process conducted at the Institute level (E-Governance Cell). For a course to be offered, the minimum number of registrants is 30, and similarly, the maximum number of students per course is 70.

Proctors shall guide the students through registration process, and shall ensure that the student does not register for an elective that he/she has studies earlier during the program (as part of the department core/elective).

In case, a student is awarded an 'F' grade in the Open Elective course, he may reregister for the same course or a different elective course.

Based on resources available, departments may offer all or few of the proposed electives.



# B. II. B. COLLBGB OF ENGINEERING, BBRGALURU OSYWZZSZXZ OR CZVIC SXCMSZZZIXC

Course	Occupational Safety .And I lealth Administration	Course Code	2IC\'80EOSII	SEE Duration	3
Credits	3	L:T: P	3-0-0	SEE*KIE <b>Marks</b>	50+50

i.iii 'xyx iiniri. 1 ix c9: 1 o into ice occupational sarety ann neaiin as a vitai tool ror enforcing safe work ink condit ions. The main aim of the course is to impart know'ledge on the concept and application of safeiy and health ifiues at w'ork environment.

/}IR	SE OUTCOMES: \n shilitj' to
COI	Demonstrale ltte knoz'ledge of principles of safety and Legislation
1. 1 1X	oxpiain acci0enl thresligat ion ant xeporting
1. 1 1X	
i.iiu	ttecognize tñe various Lazarus - risk analysis. hitislrale tñe various xc tipationai ñeaitñ
	and Toxicologx' issues.

#### UNIT-1

#### Principles of safety:

1 history of Safety movemenl. Evolution of modem safety concept.- General concepts of management planning for safety for opt imizat ion of pmd ttcti\'ily. Prof ttcti\'ily, quality and safety line and staff. Funcli ons for safety -budget ink for safety. Safety policy. Iricidenl Recall Technique (IRT), disaster con1rml, job safety analy s is, safety stir v'ey, safety inspection, Safety sampling, ev'aluatiori of performance of stipervisors on safety. Occu National safety and I leallh act, G ttide lines, Occupational safely and I lealth adfininistration, R ight lo know' law's, E1 IS (environment, lleallh and safety) compliance. Safety and gadgels and equipments. IO Hrs

#### UNIT - 2

#### .4.ccident In\'estigation and Re\+nrting

C'oncept of an accidenl, reportable and non-repuriable accidents, reporting to statutory authorities principles of accidenl prex'en1ion accident inx'estiga1ion and analysis record s for accidenls, departmental accidenl reports, documentalion of accidents unsafe act and condit ion, domino seq hence —super v'isory role —rule of safety committee cost of accident. Recommended practices for compiling and measuring work injury experience —permanent loml disabilities, permanent partial disabilities, temporary total disabilities -Calculation of accidenl indices. 9 Hrs



## B.M.8.COLLRGBOFRRGDfRRRdRG,BBRGALURU DBPARVHRFTOFCIVILBNGIRBRIflNG

#### UNIT-3

#### Fire prevention and control

Sources of ignition —fire triangle—principles of fire extinguishing—active and passive fire protection systems—various classes of fires A, B, C, D, E—types of fire extinguishers—fire stoppers—hydmnl pipes—hoses—monitors—fire watchers—lay out of stand pipes—fire station -fire alarms and sirens—maintenance of fire tructs—foam generators—escape from fire rescue operations—fire drills—notice -first aid for burns, PPE

8 hrs

#### UNIT-4

#### hazard risk snslysis

Introduction, hazard, hazard monitoring -rist issue, group or societal risk, individual risk, voluntary and involuntary risk, social benefits Vs technological rist, approaches for establishing risk acceptance levels, Risk estimation.

I lazard assessment, procedure, methodology; safety audit, checklist **analysis**, what if **analysis**, **safety** review, preliminary hazard analysis(PI IA), human error analysis, hazard **operability** studiestI **IAZOP**), safety warning systems-Fault Ttee Analysis and Event Tree **Analysis**, Logic symbols, methodology, Ergonomics

#### UNIT-5

#### Occupational beslth and Toxicology

I lealth considerations at work place-Types of diseases and their spread, I lealth Emergency, Environmental Management plans for safety and sustainability 6 Hrs

#### Text books:

- Occupational safety and Ilealth for Technologists, Engineers and Managers: Geolech. D.L.Prentice I fall publishing.
- 2. Essentials of safety management: Kaila and singh, I Iimalaya publishing house.
- 3. Fire safety in Buildings. V.K.Jain, New Age Publishers

#### Reference books:

- 1. National safety council of India, GOl Publication.
- 2. Loss prevention society of India publication
- 3. Industrial Accident prevention. I Heinrich I LW. Mcgraw hill publication



# B. M. B. COEMMMB OR RNGDO68IURO, BENOAEURU owxezamaz os cxwz xamxezemo

C.our;e	Susfoinobiliry and Life, cv'etc Assessment	t.ourse Code	2 i t. \ 6tl£SLA	Düration	n )10Inf S
Credits	03	L:T:P	3!0:0	SEE+ CIE Marks	50—50

#### t. €i t? RSE OB3 ECTI V ES:

The niodern•dny eiigineers are expected to give technological solutions to the broadly understood societal problems and enhance the u'ell•be ing of the hurnaii society and the ay a ayvtem. Knou ing tlint human socier,' and environment need to co•ex ist in a 'vusininable' manner. it has become imperative for engineers to understail the solution vpace beyond the conventional technical solutiony. It is iniportail to educate the graduating vtudenty to differeilt aspects of 'suvtainability' and engineering systems

COI	/uant fy the au stanwbJe Indices
CO2	Dec de system boundar es for LL"A and pertonn LL"A
0:03	Relate engineering destiny in suvtailuible pamineters

Concept of Sustainability. Sustainable engineering and practices. Pillars of sustainability. Challenges to Sustainability. L£SCO sustainable development goals.

Hours: 6

Sustainable development indices. Resources and energy consumption. waste nianagement GHG einivious and ecooindicatory.

Hours: 7

Materials • understanding the properties beyond engineering parameters. C'onwnon materials' consuinpt ion and lifecycle patterns. Estiniat ion of embodied energy of materials • humerical and case studies.

Hours: 7

#### UNIT-4 Life-cycle analysis of products and systems

Component of lifecycle analysis and estimation. Evtimation of lifecycle. £nd•of•life analysis • Numerical arid case studies

Hours: 8

#### UN11-5 Strategies for sustainable engineering

Impact audit procevy, Selection of suitable alternatives • the 3R strategy and other



# B. M. B. COEMMMB OF RNGDO68IURO, BENOAEURU OWWMW OSMZ XAOMZMO

strategies. Choice of reuse able formy, 1.ifevtyle practices, £nergy•cost re Intionsliips. I'roinotton of suvtainabilit y through incentives.

Hours: 8

#### Tezt books:

I. Material v arid the Environment • Michael Ashby, Elsevier 20.

#### Refereoce book and codes:

- I. National Building Code of India 201. 6. part 2. BlS, Ken' Delt i
- 2. Inventory o I C'arbon and Energ', University of Bath. Sustainable £nergy Research Team
- 3. Engineering for sustainable Development 'Guiding Principles. The Royal Academy' of Engineering, 2005
- 4. Sustainable Construct ion Green Building Design arid Delivery. Charley J Kibert. 20. 13
- 5. Alteniative building Materials and Technologies 2 K S Jagadish. B V \'enkatarania Reddy arid K S KanjundaRao. New Age Inteniational Ltd. Publishers, Ken' Delhi. 20. 17.

#### SEE paper pattern:

To set One question each in Quits t. 2. 5 and two question v each in (Jnitv 3 and 4. Students to ansu'er Fis'e questions by selecting one quevt ion from eact Unit. All quevtions should care, equal marks \} 20 marks for one full question). £acli question vhould not have more thaii four vubdivis ions.

COU	RSE:	Sustainability and Lifecycle Assessment							CODE: 21CV8OESLA						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
001	<b>&gt;</b>	<b>~</b>			<b>~</b>	<b>~</b>	<b>~</b>								
°O2	✓	✓	✓	✓	✓	✓	✓					✓			

COURSE: Sustali 21£i¥• WESLA	COOE:		

**Dept. of Aerospace Engineering** 

**Cryogenics for Aerospace Engineering** 

(Open Elective for 8<sup>th</sup> Semester)

**Course Title:** Cryogenics for Aerospace Engineering

Course Code: 21AE8IE CAE

**Pre requisites:** 1. Basic Thermodynamics

2. Fluid Mechanics

3. Fundamentals of Aerospace Engineering

Unit 1

Cryogenics fluids: Liquid Nitrogen, Liquid Oxygen, Liquid Argon, Liquid Neon, Liquid Hydrogen, Liquid Helium: Super conductivity of Liquid Helium, Rollin film, zero viscosity,

Fountain effect, second sound propagation in liquid helium, applications of cryogenics fluids in

Aerospace Industries.

6 Hours

Unit 2

Cryogenic propellants for Rocket Propulsion: Nature of propellant, challenges, Performance analysis-Thrust and velocity gains, specific impulse, launching and staging, selection of Propellant, design concept-Boil off rate, transportation, storage tanks, Feed system, Tank pressurization and vent system, two phase flow in reduced gravity, Main attributes of cryogenic Engines, Criteria for design of Cryogenic Engines, Types of bipropellant Engine power cycles:

Gas Generator cycle, Staged Combustion cycle, Expander cycle, Pressure fed cycle

10 Hours

Unit 3

Gas Liquefaction and Separation: Joule Thompson effect, Linde Hampson method, Pre-cooled Linde Hampson method, Dual pressure Linde Hampson method, Claude process, Kaptiza process, Collins's process, Heylandt Process, Gas separation by McCabe -Thiele method in

Rectification column.

8 Hours

#### Unit 4

**Cryo coolers and Cryogenic Insulations**: Classifications of Cryocoolers, Gifford Mcmohan cryocooler, Pulse Tube cryocoolers, Solvay cryocooler and Stirling type crycoolers-Schmidt analysis and Walker Chart, Cryogenic insulation classification and its necessity, Expanded foam, Gas filed foam and fibrous material, Vaccum type, Opacified powders and Multilayer insulation, Vaccum Technology and cryo pumping

10 Hours

#### Unit 5

**Vaccum Technology and Cryo pumping:** Conduction, run down time, pumping speed, cryopump classifications, Rotary vane pump, root pump, diffusion pump, turbo molecular pump and cryo pump.

**5 Hours** 

#### Text books:

- 1. Thomus M. Flyn, Cryogenic Engineering, second edition (2006), Marcel Dekker, New York.
- 2. Mamata Mukhyopadyay, Fundamentals of Cryogenic Engineering (2010), PHI Pvt learning Ltd.

#### **References:**

NPTEL-Cryogenic Engineering by Prof. MD Atrey.

https://archive.nptel.ac.in/courses/112/101/112101004/

CO1	To understand the working of cryogenic fluids and its applications
CO2	To understand the cryogenic rocket propulsion and its propellant types
CO3	To understand the liquefaction and separation process in cryogenics
CO4	To understand the working of cryocoolers and to have knowledge on cryogenic
	insulation
CO5	To understand the cryo pumping and vacuum technology

Answer full five questions and set the question paper by giving choices in Unit 2 and Unit 4.



# B. M. S. COLLEGE OF ENGINEERING, BENGALURU-560 019 (Autonomous College under VTU | Accredited by NBA | Approved by AICTE) DEPARTMENT OF MECHANICAL ENGINEERING

Course			edits	s: 03	•	Marks		
Name	Organizational Behavior	L	T	P	S	CIE	SEE	
Code	21ME8OEORB	3	0	0	0	50	50	

#### **Syllabus**

#### UNIT 1

**Introduction:** Definition and Historical development, environmental context (Information technology and globalization, design and cultural, reward systems)

**The Individual:** Foundations of individual behavior, individual differences. Ability, attitude, aptitude, interests, values, Job satisfaction-measuring job satisfaction, Personality-Myers Briggs type, Big five model, Emotions and moods

10 Hours

#### UNIT 2

**Learning:** Definition, theories of learning, Individual decision making, classical conditioning, operant conditioning, social learning theory, continuous and intermittent reinforcement

Perception: Definition, Factors influencing perception, attribution theory, selective perception,

projection, stereotyping, halo effect, attribution theory, east west perception, shortcuts in judging others, Decision making in organizations, common biases and errors in decision making

10 Hours

#### UNIT 3

**Motivation:** Process of Motivation, Need Hierarchy theory, theory X theory Y, two factor theory, Alderfer's ERG theory, McClelland three needs theory, victor vrooms expectancy theory

**Groups:** Definition and classification, factors affecting group formation, stages of group development, norms, Hawthorne studies, group processes, tasks and decision making

07 Hours

#### **UNIT 4**

**Conflict and Stress Management:** Definition of conflict, functional and dysfunctional conflict, stages of conflict process. Sources of stress, fatigue and its impact on productivity. Job satisfaction, job rotation, enrichment, job enlargement and reengineering work process

06 Hours

#### UNIT 5

**Interpersonal and Organizational communication:** Concept of two-way communication, Communication process, types of organizational communication, improving communication, transactional analysis in communication, barriers in communication, overcoming barriers

**Organizational Change and Development:** Concept, need for change, theories of planned change, organizational diagnosis. **06 Hours** 

#### **Text Books:**

- 1. Organizational Behavior: Stephen Robbins, 9th edition, Pearson Education Publications
- 2. Organizational Behavior: Fred Luthans, 9th edition, McGraw Hill International Edition
- **3. Organizational Behavior:** McShane, S. L., M. A. V. Glinow and R. R. Sharma, Tata McGraw Hill, New Delhi.

#### **Reference Books:**

- 1. Organizational Behavior- Aswathappa- Himalaya Publishers-2001
- 2. Organizational Behavior-John Newstron, Keith Davis, 9th edition-2002
- 3. Organizational Behavior: Human Behavior at Work Newstrom, John W. and Keith Davis, Tata McGraw-Hill, New Delhi.
- 4. Management of Organisational Behaviour: Utilising Human Resources Hersey, Paul, Kenneth H. Blanchard and Dewey E. Johnson, Prentice Hall, New Delhi

#### **Course Outcomes**

Upon completion of this course, student will be able to:

CO1	Explain the determinants of behavior and the emerging concepts in organizational behavior
CO2	Get an overview of management, theory of management and practical applications of the same
CO3	Understand the definition and concepts of behavior, groups & teams, organizational structure,
	employee motivation, organizational communication, conflict & stress, organizational change &
	development
CO4	Demonstrate clear understanding of the concepts and established theories relating to organizational
	behavior
CO5	Effectively use their individual skill to work in groups to achieve organizational goals and ability to
	lead groups/teams
CO6	To help students to understand human behavior in organizations and equip them to enhance their
	performance as well as performance of the people reporting to them

#### **Scheme of examination:**

- Answer five full questions selecting one from each unit.
- To set one question each from unit 3, 4 and 5 and two questions from unit 1 and unit 2



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#### DEPARTMENT OF MECHANICAL ENGINEERING

#### **VIII Semester - Open Electives**

Course		Cre	edits :	о3	Marks	
Name	Financial Management	L	T	P	CIE	SEE
Code	21ME8OEFIM	3	0	0	50	50

#### **SYLLABUS:**

#### UNIT - 1

Introduction to Financial Management: Forms of organization.

**Risk and Return:** Risk and return relationship, methods of measuring the risk, Business risk, financial risk, calculation of expected rate of return to the portfolio, numerical problems. Time Value of money – simple & compound interests, present work, future work of assest with equal unequal. **09 Hours** 

#### UNIT - 2

**Working Capital Management:** Definition, need and factors influencing the working capital requirement. Determination of operating cycle, cash cycle and operating cycle analysis. Calculation of gross working capital and net working capital requirement.

**Long term Financing:** Raising of finance from primary and secondary markets. Features, merits and demerits of Equity Shares, debentures and preference shares. Numericals.

**09 Hours** 

#### UNIT - 3

**Book Keeping:** Types of accounts, Rules of accounting single entry and double entry. Preparation of Journal Ledger, Trial balance, Financial statements i.e, Trading A/c, P & I A/c, Balance Sheet etc., numericals **o7 Hours** 

#### UNIT - 4

**Costing:** Classification of cost, preparation of cost sheet, absorption and variable costing, job costing, process costing. Classification of the variances analysis – material, labour and overhead variances, numericals **07 Hours** 

#### UNIT - 5

**Dividend Decision:** Irrelevance and relevance of Dividends, Numericals.

**Determinants of Dividend Policy.** Factors, bonus shares & stock repurchase, legal procedural and tax aspects, issue of bonus shares in India, numericals **07 Hours** 

#### **TEXT BOOKS:**

- 1. Financial Management, Khan & Jain, text & problems TMH ISBN 0-07-460208-A. 2001.
- 2. Financial Accounting, Costing and Management Accounting, S. M. Maheshwari, 2000.

#### **REFERENCE BOOKS:**

- 1. Financial Management, I. M. Pandey, Vikas Publication House ISBN 0-7069-5435-1, 2002.
- 2. Financial Management, Abrish Gupta, Pearson.
- 3. Financial Decision Making, Humpton, 2000.
- 4. Financial Management, Theory and Practice, Prasanna Chandra TMH ISGN 07-462047-
- 9, 3rd edition 2002.

#### E-BOOKS:

- 1. https://books.google.co.in/books?isbn=8131711048, Taha 2008. 2.
- 2. https://books.google.co.in/books?isbn=8121902819 3.
- 3. https://books.google.co.in/books?isbn=8131700003,A. M. Natara P. Balasubramani 2006

#### **COURSE OUTCOMES:**

At the end of the course the student is expected to:



# $\textbf{B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19} \\ \textbf{(Autonomous College under VTU | Accredited by NBA | Approved by AICTE)}$

#### DEPARTMENT OF MECHANICAL ENGINEERING

CO 1	Compare the different forms of organizations and measure returns and risk under
	different economic conditions.
	Estimate the working capital required to manage a firm's working capital efficiently.
СО 3	Propose suitable form of long term financing.
CO 4	Examine a firm's financial statement and evaluate its performance
CO 5	Prepare cost sheets and compute variances
CO 6	Plan different types of budgets

Scheme of Examination (SEE):
Answer five full questions selecting one from each unit.
To set one question each from Unit 3, 4 & 5 and two questions each from Units 1 & 2.



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#### DEPARTMENT OF MECHANICAL ENGINEERING

Course			edits :	03	Marks		
Name	Data Science using Python*	L	Т	P	CIE	SEE	
Code	22ME8OEDSP	3	0	0	50	50	

<sup>\*</sup>Except Mechanical Students

#### **SYLLABUS:**

#### UNIT - 1

**Exploratory Data Analysis:** Structured Data, Rectangular Data, Mean, Median, Standard Deviation, Data Distribution - Frequency Tables, Histograms, Exploring Binary and Categorical Data, Correlation Matrix. **06 Hours** 

#### UNIT - 2

**Regression:** Simple Linear, Multiple Linear and Polynomial regressions, Coefficients or weights, Least-squares, R-square, Accuracy, Cross-validation, Interpreting the Regression Equation, Outliers. **07 Hours** 

#### UNIT - 3

**Classification:** Confusion Matrix, Logistic Regression, Support Vector Machine Classifier, ROC Curve, Distance Metrics, K-Nearest Neighbours, Choosing K. **07 Hours** 

#### UNIT - 4

**Statistical Machine Learning:** Decision tree, Tree Pruning, Bagging and Randon Forest, Boosting - AdaBoot, Image classification using bagging and boosting. **09 Hours** 

#### UNIT - 5

**Unsupervised Learning:** Hierarchical Clustering, Dendrogram, Measures of Dissimilarity, K-Means Clustering, Selecting Number of Clusters, Image segmentation using clustering. **Neural Networks:** Introduction to ANN, Perceptron, Introduction to CNN and CNN architecture, Demonstration of ANN and CNN (No programming for SEE). **10 Hours** 

#### **Text Books:**

- 1. Peter Bruce, Andrew Bruce, and Peter Gedeck. Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python. O'Reilly Media, 2020.
- 2. Sandipan Dey. Hands-On Image Processing with Python: Expert Techniques for Advanced Image Analysis and Effective Interpretation of Image Data. Packt Publishing Ltd., 2018.

#### **Reference Books:**

- 1. Glenn J. Myatt, Wayne P. Johnson Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining, 2nd Edition, Wiley, 2014.
- 2. EMC Education Services. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. Wiley, 2015.
- 3. Jake VanderPlas. Python data science handbook: Essential Tools for Working with Data. O'Reilly Media, 2016.
- 4. Yuxi (Hayden) Liu. Python Machine Learning by Example, 2nd Edition, Packt Publishing Ltd., Wiley, 2019.

#### MOOCs:

1. https://www.coursera.org/specializations/practical-data-science

- 2. https://www.coursera.org/professional-certificates/google-data-analytics#courses
- 3. https://www.edx.org/professional-certificate/python-data-science

#### **COURSE OUTCOMES:**

Upon completion of this course, student will be able to:

	•
CO 1	Organize data and use data for structured programming.
CO 2	Identify the proper data science techniques for engineering data.
СО 3	Apply the techniques of supervised and unsupervised learning, image classification and segmentation techniques for engineering data.
CO 4	Demonstrate ANN and CNN techniques through group activity/assignment.

#### **Scheme of Examination (SEE):**

Answer five full questions selecting one from each unit. To set one question each from Units 1, 2, & 3; and two questions each from Units 4 & 5. ANN or CNN programming should not be asked for SEE.



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#### DEPARTMENT OF MECHANICAL ENGINEERING

Course		Credits: 03			Marks	
Name	Polymer Science and Technology	L	Т	P	CIE	SEE
Code	22ME8OEPST	3	0	0	50	50

#### **SYLLABUS:**

#### UNIT – 1

Fundamentals of Polymer Science: Introduction; Types of Polymerizations and their Mechanism; Nomenclature of Polymers; Polymer Molecular Architecture; Bulk, Suspension, Emulsion and Solution Crystallinity; Thermal Transitions in Polymers. 10 hours

#### UNIT - 2

**Basic Polymeric Materials:** Property Requirements and Polymer Utilization; Thermoplastics - Commodity and Engineering Plastics; Thermosets. 07 hours

#### UNIT - 3

Advanced Polymeric Materials: Elastomers; Natural Rubber and Synthetic Rubbers; Thermoplastic Elastomers; Blends and Reinforced Polymers. 06 hours

#### **UNIT - 4**

**Properties of Polymers:** Viscoelastic Behaviour of Plastics; Time – Temperature Superposition; Stress-Strain Behaviour; Fracture; Creep; Hardness; Impact Behaviour; Methods to Improve Mechanical Properties; Basics of Polymer Rheology; Permeability; Electrical; Optical and Flammability Properties. 10 hours

#### UNIT - 5

Compounding and processing of polymers: Plastics Technology; Fibre Technology; Elastomer technology. 06 hours

#### **TEXTBOOKS:**

- 1. R. O. Ebewele, Polymer Science and Technology, 1st Edition. CRC Press, 2000.
- 2. V. R. Gowariker, N.V. Viswanathan, and J. Sreedhar, Polymer Science, 1st Edition. New Age International, 2011.

3. C. S. Brazel and S. L. Rosen, Fundamental Principles of Polymeric Materials. 2<sup>nd</sup> Edition, John Wiley, 2012.

#### **REFERENCE BOOKS:**

- 1. F. W. Billmeyer Jr., Textbook of Polymer Science. 3<sup>rd</sup> Edition, John Wiley, 2007.
- 2. J. R. Fried, Polymer Science and Technology. 3<sup>rd</sup> Edition, Prentice Hall, 2014.
- 3. M.P. Stevens, Polymer Chemistry-an Introduction. 3<sup>rd</sup> Edition, Oxford University Press, 1999.

#### **MOOCs:**

- 1. <a href="https://nptel.ac.in/courses/103/106/105106205/">https://nptel.ac.in/courses/103/106/105106205/</a>
- 2. <a href="https://nptel.ac.in/courses/104/105/104105124/">https://nptel.ac.in/courses/104/105/104105124/</a>
- 3. https://nptel.ac.in/courses/112/107/112107221/

#### **COURSE OUTCOMES:**

Upon completion of this course, student will be able to:

CO 1	Identify suitable polymer(s) and suitable molding and forming process for a given application.
CO 2	Measure the properties of a polymers.
CO 3	Correlate the polymer structure with the properties.
CO 4	Develop polymeric materials for given applications.

**SCHEME OF EXAMINATION (SEE):** Answer five full questions selecting one from each unit. To set one question each from Units 2, 3 & 5 and two questions each from Units 1 & 4.

#### (OPEN ELECTIVE-III)

Course Title	OPERATIONS RESEARCH					
Course Code	19MD8OE3OR	Credits	3	L-T-P	3-0-0	

Prerequisites: Matrix computations, Statistics and Probability

**Course Description:** To acquaint the students with quantitative methods and different techniques for effective decision making; model formulation and applications that is used in solving business decision problems in various environments. The course includes linear programing, transportation, assignment problems, CPM/PERT techniques, Game theory.

#### **Course outcomes:**

At the end of the course, the student will have the ability:

CO1	Formulate a real-world problem as a mathematical programming model.
CO2	Formulate and solve transportation models by applying cost cutting strategies.
CO3	Formulate and solve assignment models and travelling salesmen problems.
CO4	Construct a project network and apply program evaluation review technique and critical path management.
CO5	Employ Game theory for strategic decision making.

UNIT-I 07 Hrs

**INTRODUCTION:** Evolution, definition, scope of OR, application areas of OR, steps (phases) in OR study, characteristics and limitations of OR, models used in OR, Linear Programming Problems (LPP) - Formulation of LPP-Graphical solution. Use of slack, surplus and artificial variables, Canonical and Standard forms, Solution of LPPs using Simplex method, Big- M method.

<u>UNIT-II</u> 08 Hrs

**TRANSPORTATION PROBLEM:** Formulation of transportation problem, types, initial basic feasible solution using North-West Corner method, least cost method, Vogel approximation method, Degeneracy in transportation problems, optimal solutions by MODI method.

UNIT-III 08 Hrs

**ASSIGNMENT PROBLEM-** Formulation, types, Hungarian method for assignment problem, unbalanced assignment problem, application to maximization cases and travelling salesmen problem

09 Hrs UNIT-IV

PERT-CPM TECHNIQUES: Introduction, network construction-AON & AOA diagrams, Fulkerson's rule for numbering the events, Critical path method to find the expected completion time of a project, floats; PERT for finding expected duration of an activity and project, determining the probability of completing a project. Predicting the completion time of project; crashing of simple projects.

**UNIT-V** 08 Hrs

**GAME THEORY:** Formulation of games, types, solution of games with saddle point, Solution of games without saddle point, 2x2 games without saddle point, graphical method of solving mixed strategy games, dominance rule for solving mixed strategy games.

**UNIT Choice: Unit-I and Unit-IV** 

#### **Text books:**

- 1. S.D. Sharma-Operations Research, KedarnathRamanath& Co.2002
- 2. R. Panneerselvam-Operations Research, second edition, PHI Learning Private Limited 2011
- 3. Richard Bronson, GovindasamiNaadimuthu: Schaumn Outline series-second edition, Tata McGraw Hill edition 2004, Eleventh reprint 2011

#### Reference books:

- 1. Hiller and Liberman -Introduction to Operations Research, Ninth edition Mc Graw Hill Publications
- 2. Hamdy A Taha H A- Operations Research, eighth edition, Pearson Prentice Hall.
- 3. KantiSwarup, P K Gupta, Man Mohan, Operations Research, Sultan Chand & Sons, 2010.

#### E-Learning:

- 1. https://books.google.co.in/books?isbn=8131711048,Taha-2008.
- 2..https://books.google.co.in/books?isbn=8121902819
- 3. https://books.google.co.in/books?isbn=8131700003,A. M. Natara P. Balasubramani 2006

#### Semester: 8th Sem

<b>Course Title</b>	Smart Grid Technologies				
	(Open Elective)				
Course Code	19EE80E3SG	CREDITS	3	L-T-P	

**Pre-requisite: NIL** 

**Course Outcomes:** Upon completion of the course, the students will be able to

- 1. Get acquainted with the smart resources, smart meters and other smart devices.
- 2. Describe how modern power distribution system functions.
- 3. Identify suitable communication networks for smart grid applications

#### **UNIT-1**

**Introduction** – Introduction to Smart Grid and Smart cities, Evolution of Electric Grid, Smart Grid Concept - Definitions and Need for Smart Grid – Functions – Opportunities – Benefits and challenges, Difference between conventional & Smart Grid, Technology Drivers.

04 Hrs

#### UNIT-2

**Energy Management System (EMS)** - Smart substations - Substation Automation - Feeder Automation, SCADA - Remote Terminal Unit - Intelligent Electronic Devices - Protocols, WAMS- Phasor Measurement Unit-PMU protocols, case studies. **08 Hrs** 

#### **UNIT-3**

Renewable Energy Sources and Storage in Smart Grid: Sustainable Energy Options for Smart Grid- Solar Technology, Wind Power Systems, Biomass Energy, Small and Micro-Hydro power, Penetration and Variability Issues Associated with Sustainable Energy Technology, Energy Storage Technologies, Case Studies

08 Hrs

#### UNIT-4

**Introduction to Smart Meters** – Advanced Metering infrastructure (AMI), AMI protocols – Standards and initiatives, Demand side management and demand response programs, Demand pricing and Time of Use, Real Time Pricing, Peak Time Pricing.

10 Hrs

#### **UNIT-5**

Elements of communication and networking – Architectures, standards, PLC, Zigbee, GSM, BPL, Local Area Network (LAN) - House Area Network (HAN) - Wide Area Network (WAN) - Broadband over Power line (BPL) - IP based Protocols - Basics of Web Service and CLOUD Computing, Cyber Security for Smart Grid.

10 Hrs

#### **Text Books:**

- 1. Stuart Bolas' 'Smart Grid: Infrastructure, Technology and Solutions', CRC Press 2012.
- 2. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, 'Smart Grid: Technology and Applications', Wiley, 2012.

3. Kenneth C.Budka, Jayant G. Deshpande, Marina Thottan, 'Communication Networks for Smart Grids', Springer, 2014.

#### **Reference Books:**

- **1.** Nouredine Hadjsaid and Jean-Claude, "Smart Grids', Wiley Publications, ISBN-978-1-84821-261-9
- **2.** Uma Rao K, Prema V. 'Smart Grid-Fundamentals, Design, Technology, Applications, Communications and Security', 1<sup>st</sup> Edition, 2012, Wiley India Pvt. Ltd. ISBN: 978-93-5425-321-9
- **3.** Bernd M. Buchholz, 'Smart Grids Fundamentals and Technologies in Electricity Networks', 1st Edition, 2016, Springer Vieweg Publisher, ISBN-13: 978-3662525265.

Unit choice 3 & 5

<b>Course Title</b>	Holistic Approach to Electrical Safety					
<b>Course Code</b>	21EE8OE3ES					
CIE	50Marks(100% weightage)	SEE	100 Marks(50% weightage)			

#### **Prerequisites:**

#### **Basic Electrical Engineering**

**Course Description:** This Course caters to the Electrical safety Operations and Standards.

The course helps students to understand the subjects of safety from fundamentals to the as-on-today status and to select and apply hundreds of remedies with respect to personal or equipment safety. Systematic basic approach leading to the details, step by step, reinforced with the statutory provisions, Standards and regulations and case studies will mould the safety professionals to help the industries to fulfil their legal requirements.

#### Course Outcomes:

		PO(s) Mapped
CO1	Understand the importance of safety in an electrical environment	PO1
CO2	To apply the procedures and guidelines for protection and Earthing	PO2
CO3	To apply and practice the Safety norms for personnel safety in electrical installations	PO6
CO4	To comprehend Operations, Maintenance and audit related to safety of Electrical systems.	PO9
CO5	Exposure to Standards and Regulations related to electrical safety	PO12

#### **UNIT-I-Electrical Safety Aspects**

8 Hours

Basic Electrical concepts,- stored energy, electrical shocks, Effects of electrical parameters on human body and its severity, Safety measures-general and main, Safety of the self, Safety of the equipment, Safety of the Public

#### **UNIT-II-Protection Procedures**

8 Hours

Overload and short circuit protection, Protection against surges and voltage fluctuations, Earth fault protection, No load protection, Protection against lightning,

#### **UNIT-III- Safety Operations and Earthing**

8 Hours

Sign boards, Tagging System -Lock out and Tagout, PPE, Earthing: Necessity of earthing, Earth insulation and continuity tests, Earthing standards, Bonding, Electrical work in hazardous atmosphere, Static electricity — Operations of machines generating static charge

#### **UNIT-IV-Safe Operating Procedures, Maintenance of Equipments**

8Hours

Utility and Manufacturers websites, SOPs, Maintenance and Health monitoring of equipments, Tests and Audits, case Studies

#### **UNIT-V-Electricity Standards and Regulations**

8 Hours

Indian Standards, IEC, IEEE Standards, National Electric Code (NEC), Indian Electricity rules and Regulations

	UNIT CHOICE: II and III						
Text be	ooks:						
1	Fundamentals of IndustrialSafety and Health, 2008 Edition, by Dr K.U.Mistry						
2	A Practical Guide Vol 1 to 4, National Safety Council, India						
3	IS 5216(Part-I- "Recommendations on safety Procedures and Practices in Electrical						
	Work						
Refere	nce Books:						
1	Indian Electricity Rules: IE Rules 2020						
2	IS 8437 ( Part 1): 1993 IEC Pub 479-1 ( 1984 ) Guide On Effects Of Current						
	PassingThrough The Human Body – General Aspects						
3	IEEE Standard 902						
4	Course material and Related Technical Papers, websites of interest						



#### BMS College of Engineering, Bangalore – 19

(Autonomous College under VTU)

<b>Course Title</b>	MICRO ELECTROMECHANICAL SYSTEMS (MEMS)						
<b>Course Code</b>	19EC8OE3ME						
CIE	50 Marks(100% weightage)	SEE		100 Marks (50%			
				weightage)			

**Prerequisites: NIL** 

#### **Course outcomes:**

At the end of the course, the student will have the ability

CO-1	<b>To understand</b> the sensing principles of microsystems for real time
	applications
CO-2	To <b>design</b> the microstructure using various micromachining process and
	tailor the device structure as per the requirement.
CO-3	To <b>analyse</b> various MEMS devices using simulation tools.

Unit-I 07hrs

Overview of MEMS & Microsystems: MEMS & Microsystems, Typical MEMS and Microsystem Products, Evolution of Microfabrication, Microsystems and Microelectronics, The Multidisciplinary nature of Microsystem Design and Manufacture, Microsystems and Miniaturization, Applications of Microsystems in the Automotive and other Industries.

Unit-II 09hrs

#### **Working principles of Microsystems:**

**Micro sensors** — Acoustic Wave, Biomedical and biosensors, Chemical, Optical, Pressure and Thermal Sensors.

**Microactuation:** Actuation using Thermal forces, Shape-Memory Alloys, Piezoelectric crystals & Electrostatic forces.

UNIT III 07hrs

**MEMS** with Microactuators: Microgrippers, Micromotors, Microvalves, Micropumps, Microaccelerometers, Microfluidics.

Materials for MEMS and Microsystems: Introduction, Substrates and wafers, Active Substrate materials, Silicon as a substrate material, Silicon compounds, Silicon piezoresistors, Gallium Arsenide, Quartz, Polymers for MEMS, Packaging materials.

Unit-IV 09hrs

#### **Micromachining Technologies**

**Thin Film Deposition**: Evaporation, Sputtering, Chemical Vapor deposition, Epitaxial growth of Silicon, Thermal Oxidation for Silicon dioxide. Lithography.

**Etching**: Isotropic Etching, Anisotropic Etching, Etch Stops, Dry Etching. Silicon Micromachining, Advanced Process for Microfabrication.

Unit-V 07hrs

**Integration and Packaging:** Microsystems and Microelectronics, Objectives of packaging, Special Issues in packaging, Types of microsystem Packages, Packaging Technologies, Reliability and Key failure mechanisms.

Choice: Unit-III and Unit-IV

#### **Text books:**

- 1. Tai-Ran Hsu- MEMS and Micro systems: Design, Manufacture and Nano scale Engineering, 2<sup>nd</sup> Edition (JOHN WILEY & SONS).
- 2. G.K. Ananthasuresh, K.J.Vinoy, S. Gopalakrishnan, K.N.Bhat, V.K.Aatre, Micro and smart systems 1<sup>st</sup> edition (WILEY INDIA)

#### **REFERENCE BOOKS:**

1. NadimMaluf, Kirt Williams - An Introduction to Microelectromechanical Systems Engineering, 2<sup>nd</sup> Edition (ARTECH HOUSE)

#### E Books:

- 1. <a href="https://www.comsol.co.in/video/how-set-up-run-simulation-comsol-multiphysics">https://www.comsol.co.in/video/how-set-up-run-simulation-comsol-multiphysics</a>
- 2. <a href="http://1.droppdf.com/files/MC684/encyclopedia-of-materials-characterization.pdf">http://1.droppdf.com/files/MC684/encyclopedia-of-materials-characterization.pdf</a>
- 3. <a href="https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-777j-design-and-fabrication-of-microelectromechanical-devices-spring-2007/lecture-notes/">https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-777j-design-and-fabrication-of-microelectromechanical-devices-spring-2007/lecture-notes/</a>

#### **MOOCs:**

- 1. <a href="https://nptel.ac.in/courses/117/105/117105082/">https://nptel.ac.in/courses/117/105/117105082/</a>
- 2. https://nptel.ac.in/courses/108/108/108108113/

#### BMS College of Engineering, Bangalore – 19

(Autonomous College under VTU)

<b>Course Title</b>	AUTOMOTIVE ELECTRONICS				
<b>Course Code</b>	19EC8OE3AE	Credits	3	L-T-P	3:0:0
CIE	50 Marks(100% weightage)	SEE		100 Marks (50%	
				weightage)	

#### **Course outcomes:**

At the end of the course, the student will have the ability

CO-1	Apply the knowledge of engineering and science to analyze the performance of Automotive Battery Systems, Electronic Engine Control, working of Sensors and Actuators
CO-2	Analyze the Vehicle Level Electronic Control for Automotive Subsystems.
CO-3	Gain insight about building future automotive subsystems that contributes to the safety and health of the society using block diagram approach

Unit-I 07hrs

**Automotive Fundamentals Overview**: Four Stroke Cycle, Engine Control, Ignition System, Spark plug, Spark pulse generation, Ignition Timing, Drive Train, Transmission, Brakes, Steering System.

Unit-II 07hrs

**Automotive Batteries and Starting System:** Different types of Batteries – principle, rating, testing, Maintenance and charging, Lithium-ion batteries, Starting system, Ignition switch, Neutral safety switch, Starter relay, Starter solenoid, Battery, Starter motor.

Unit-III 07hrs

**Electronic Engine Control**: Motivation for Electronic Engine Control, Concept of an Electronic Engine Control Engine parameters, variables, Engine Performance terms, Electronic Fuel Control System.

Unit-IV 07hrs

**Automotive Sensors** – Oxygen (O2/EGO) Sensors, Engine Crankshaft Angular Position (CKP) Sensor, Magnetic Reluctance Position Sensor, Engine Speed Sensor, Ignition Timing Sensor, Hall effect Position Sensor, Optical Crankshaft Position Sensor, Manifold Absolute Pressure (MAP) Sensor - Strain gauge, Engine Coolant Temperature (ECT)Sensor, Intake Air Temperature (IAT) Sensor, Knock Sensor, Airflow rate sensor, Throttle angle sensor

**Automotive Actuators** – Fuel Metering Actuator, Fuel Injector, Ignition Actuator and EGR Actuator

Unit-V 08hrs

**Vehicle Motion Control**—Electronic suspension system, Antilock Brake System (ABS), Electronic Steering Control

**Automotive Diagnostics**—Timing Light, Engine Analyzer, On-board diagnostics, Off-board diagnostics.

#### Overview of Automotive Network Protocols-CAN, LIN, MOST and FlexRay

**Future Automotive Electronic Systems**— Collision Avoidance Radar warning Systems, Low tire pressure warning system, Automatic Driving Control System.

#### Choice: Unit-IV and Unit-V

#### Text books:

1. William B. Ribbens: Understanding Automotive Electronics, 6th Edition, SAMS/Elsevier Publishing

#### **REFERENCE BOOKS:**

1. Robert Bosch Gmbh (Ed.) Bosch Automotive Electrics and AutomotiveElectronics Systems and Components, Networking and Hybrid Drive, 5th edition, John Wiley& Sons Inc., 2007.

#### E Books:

- $\textbf{1.} \quad www.engineering 108.com/.../Automobile.../Understanding-Automotive-Electronics-e...}$
- 2. www.sciencedirect.com/science/book/9780750675994
- 3. https://warwick.ac.uk/fac/sci/wmg/business/automotive\_batteries\_101\_wmg-apc.pdf
- **4.** http://fmcet.in/AUTO/AT6502\_uw.pdf

#### **MOOCs/NPTEL:**

https://nptel.ac.in/courses/107/106/107106088/

## **BMS COLLEGE OF ENGINEERING, BENGALURU-19**

# Autonomous Institute, Affiliated to VTU DEPARTMENT OF CSE

Academic Year	Aug-Dec 2021/Jan-May-2022	Sem.	8			
Course Title:	Cloud Computing					
Course Code:	le: 21CS8OECCT					
L-T-P:	3-0-0	Total Credits:	3			

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Introduction to Cloud Computing: Introduction, Characteristics of Cloud Computing, Cloud Models, Cloud Services Examples, Cloud-based Services and Applications, Cloud Concepts and Technologies.	8	Text Book-1 Page No.17 to Page No.59
2	Virtualization for Cloud: Need for Virtualization, Pros and cons of Virtualization, Types of Virtualization, System VM, Virtual Machine monitor, Virtual Machine properties, Interpretation and binary translation, HLL VM, Hypervisors, Xen, KVM, VMWare, Live VM migration steps and performance effects.	8	Text Book-2 Page No.1 to Page No.22,Chapter 2, Chapter 5 Text Book-3 Page No159 to 162.
3	Inter-Cloud Resource Management: Extended Cloud Computing services, Resource provisioning and platform deployment, Virtual Machine creation and Management, Global Exchange of Cloud resources.  Cloud Security and Trust Management: Cloud security defence strategies, Distributed intrusion/anomaly detection, data and software protection techniques, Reputation guided protection of data centers.	8	Text Book-3 Page No: 234 to 257
4	Hadoop&MapReduce: Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers.  Cloud Application Design: Introduction, Design consideration for Cloud applications, Reference architectures for Cloud applications	8	Text Book-1 Page No. 93 to Page No. 104 Page No. 117 to Page No. 124
5	Dockers: Understanding Dockers, The differences between dedicated hosts, virtual machines, and Docker, Running Dockers in Public Clouds, Docker Cloud, Docker on-cloud, Kubernetes: What is Kubernetes? Kubernetes Concepts, Kubernetes API, Amazon EKS, IBM Cloud Kubernetes Services.	7	Text Book-4 and Text Book-5

Prescribed Text Book							
Sl. No.	Book Title	Book Title Authors Edition		Publisher	Year		
1	Cloud Computing a Hands on Approach	Arshdeep Bahga, Vijay Madisetti	1 <sup>st</sup> Edition	University Press	2013		
2	Virtual Machines	James E Smith, Ravi Nair	1 <sup>st</sup> Edition	Morgan Kaufmann Publishers	2006.		
3	Distributed and cloud Computing from Parallel Processing to the Internet of Things	Kai Hwang, Geoffrey C. Fox, Jack J Dongarra	1 <sup>st</sup> Edition	Morgan Kaufmann, Elsevier	2013		
4	Mastering Docker	Scott Gallagher, Russ McKendrick	2 <sup>nd</sup> Edition	Packt	2017		
5	Mastering Kubernetes,	Gigi Sayfan	3 <sup>rd</sup> Edition	Packt	2020		

Referei	Reference Text Book								
Sl. No.	Book Title	Authors	Edition	Publisher	Year				
1	"Cloud Computing – Principles and Paradigms"	Rajkumar Buyya, Broberg Andrzej Goscinski,	1 <sup>st</sup> Edition	WILEY: A JOHN WILEY & SONS, INC.,	2011				

E-Bool	E-Book									
Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL				
1	Cloud Computing	Dr. Kumar Saurabh,	2 <sup>nd</sup> Edition,	WILEY INDIA.	2012	https://www.amazon.in/Cl oud-Computing-2ed- Kumar-Saurabh- ebook/dp/B01M02ECEH				

MOOC Course							
Sl. No.	Course name	Course Offered By	Year	URL			
1.	Cloud Application Security	Coursera	2021	https://www.mooc- list.com/course/cloud- application-security- coursera			

#### B | Course Outcomes

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

CO1	Ability to apply knowledge of fundamentals of Cloud Computing
CO2	Ability to <b>analyze concepts of</b> virtualization, resource provisioning, cloud security and cloud application design.
CO3	Ability to implement cloud technologies through programming models like hadoop, dockers, kubernetes

#### C | CO-PO-PSO mapping

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

#### D | Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks		
Internals	Internals TWO			
QUIZ	One	05		
Lab Component				
Alternate Assessment Tool	Demonstration of Hadoop	05		
To	50			

E	Tutorial Plan	(if applicable)	)
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**F** Laboratory Plan (if applicable)

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#### Alternate Assessment ToolPlan (if applicable)

- Hadoop installation should be demonstrated.
- Different hdfs commands to be executed

#### RUBRICS FOR EVALUATION

Sl. No.	Criteria	Excellent	Good	Average	Max Score			
		Record						
A	Hadoop Installation	4-5	4-3	2-1	05			
В	Execution of HDFS commands	4-5	4-3	2-1	05			
С	Write-up	4-5	4-3	2-1	05			
Viva								
	Total							

H | SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks		
Unit-2	Internal Choice	Two Questions to be asked for 20Marks each		
Unit-3	Internal Choice	Two Questions to be asked for 20Marks each		
Unit-4	Mandatory	One Question to be asked for 20Marks		
Unit-5	Mandatory	One Question to be asked for 20Marks		

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	25%
Apply / Analyze	50%
Create / Evaluate	25%

		Sem.	8
Course Title:	Big Data Analytics		
Course Code:	21CC8OEBDA		
L-T-P:	3-0-0	Total Credits:	3

### A Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Types of Digital Data: Structured Data, Semi- Structured Data, Unstructured Data,  Introduction to Big Data: Characteristics of Data, Definition of Big Data, Challenges with Big Data, What is Big Data? Why Big Data?  Big Data Analytics: What is Big Data Analytics? What Big Data Analytics Isn't? Classification of Analytics, Top challenges facing Big Data, Data Science, Data Scientist Terminologies Used in BigData Environment.  Bigdata technology landscape: NoSQL	8	Chapter 1: 1-10, Chapter 2: 18-25, Chapter 3:37—51, Chapter 4: 57-64
2	Introduction to Cassandra: Apache Cassandra, Features of Cassandra, CQL Data Types, CQLSH CRUD, Collections, Using a Counter, Time to Live, Alter Commands, Import and Export, Querying System Tables, Practice Examples.	8	Chapter 7: 171-211
3	Introduction to Hadoop: Introducing Hadoop, Why Hadoop? Why not RDBMS?, RDBMS versus Hadoop, Hadoop Overview, HDFS	8	Chapter 5: 74-89
4	Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN, Interacting with Hadoop Ecosystem,  Introduction to MAPREDUCE Programming: Introduction, Mapper, Reducer, Combiner, Partitioner, Searching,	8	Chapter 5: 89-99, Chapter 8: 215-223
5	Introduction to Pig: What is Pig? The Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use Case for Pig: ETL Processing, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, HDFS Commands, Relational Operators, Eval Function, Complex Data Types, Piggy Bank, User-Defined Functions (UDF), Parameter Substitution, Diagnostic Operator, Word Count Example using Pig, When to use Pig?, When not to use Pig?	7	Chapter 10: 258-276

Prescribed Text Book								
S 1. No.	Book Title Authors Edition Publisher Year							
1	Big Data and Analytics	Seema Acharya, Subjashini Chellappan	1	Wiley	2015			

Refere	Reference Text Book							
S 1. No.	Book Title	Authors	Edition	Publisher	Year			
1	Big Data with Hadoop MapReduce A Classroom Approach	Rathinaraja Jeyaraj , Ganeshkumar Pugalendhi, Anand Paul	First Edition	Apple Academic Press	2020			
2	Big Data Analytics	Radha Shankarmani, M Vijayalakshmi	Second	Wiley	2017			

E-Boo	E-Book									
S 1. No.	Book Title	Authors	Edition	Publisher	Year	URL				
1	Hadoop: The Definitive Guide	Tom White	First	O'Reilly	2009	http://index-of.co.uk/Big- Data- Technologies/Big%20Dat a%20Analytics%20with% 20R%20and%20Hadoop.p df				

МОО	MOOC Course							
S 1. No.	Course name	Course Offered By	Year	URL				
1	Big Data Fundamentals	Edx	2020	https://www.edx.org/cours e/big-data-fundamentals				
2	Big Data Specialization	Coursera	2020	https://www.coursera.org/ specializations/big-data				

#### **B** Course Outcomes

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

CO1	Apply the concept of NoSQL, Hadoop for a given task
CO2	Analyse the Big Data and obtain insight using data analytics mechanisms.
CO3	Design and implement Big data applications by applying NoSQL

#### C CO-PO-PS O mapping

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

#### D Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Written Test	Average of 2 out of 3	20
Quiz	Average of Two quizzes	10
Lab Component		
Alternate Assessment Tool	Cassandra to be executed	20
Te	50	

#### E Tutorial Plan (if applicable)

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#### **F Laboratory Plan** (if applicable)

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#### $\textbf{G Proposed Alternate Assessment ToolPlan} \ (\textit{if applicable})$

#### Note:

- The assigned faculty should take care of demonstratingthe software during the class hours
- AAT to be given as hands on assignment where Cassandra and Hadoop Basic command along with Map -reduce programs are to be executed.
  - Usage of Cassandra by creating database with suitable fields to experience the usage of all commands as mentioned in the syllabus.
  - Different database must be given to students and correctness of the execution must be evaluated.

#### **RUBRICS FOR EVALUATION**

Sl.No	Criteria	Excellent	Good	Average	Max Score			
Record								
A	Design & Specifications	4-5	4-3	2-1	05			
В	Simulation/ Conduction of the experiment	4-5	4-3	2-1	05			
С	Writeup	4-5	4-3	2-1	05			
Viva								
	To	otal			20			

#### **H SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered	
Remember / Understand	30%	
Apply / Analyze	45%	
Create / Evaluate	25%	

Course Title	fi'EB TE CI INOLOG I ES						
Course Code	20lSfiOER'Tfi	Credits	ñ3	L-T-P	3•0-11		
f.'IE	SO ftI arks	SEE	10fl Marks (50% S'eightnge)				
('ontnct 1lours / S'eek	3	Total Lecture flnurs		3f>			
Pre-requisite	Basic Programming SkiTTs						

1, NIT — I

t) tırx

HINIth. for ment structtJ re. C' nderstand in DOR I. HIRJL Heading I a•r. \\'orki nd s ith ordered and unordered I ists. I niape tab. Table and table properties. Fomi and r 1 idati ons supported by HTkILS, anchor tab, block Iceel cleirtents and inline clenien is. \\'orkinp ivith. Audio arrd \'ideo tags.

1, NIT-2

7 Hrs

f. axcu iling Sh ie Sheetx: Purpose of C bS. Inline. Ex icrnat and L DN u SS styles representation end fonrtats. Selector fonns. Property rat uc fonrLs. Font properties. Lisi properties. \ tipnnient of' tex i. color. The Box model. E-lex box. Back5rou nd iniapes. tmns ition s and animations. f'axe Stu ili: To itter Boutxtrap, A nimate. I'SS, tiiiogie Fonts, I, lyp h I ci>nx.

1, NIT - 3

8 Hrs

**.las-a Sc ript** - 1. Pmpro ni structure in la ascripi: Y'ariables. Conditions. f'unctions. srope and arnj. objorts. classes. panern matching. E seni handling.

1, NIT — o

7 Hrs

.las-a Script — t1. callback functions. arrov•- functions. J SAN. .Accessing v•-cb ecu teas using JEAN data. POSTkI \N \ PI HTT P licodc end res ponses codes.

UNIT - 5

8 Hrs

Node JS & Mongo DB: Introduction to Node Js, Events, Listeners, Limers, Calibacks, Handling Data I/0, File Access, HTTP Access, Socket Service. MongoDB: SQL Vs NoSQL, Accessing DB with Node js, Manipulating, DB data Types, Data Life cycles.

#### Tr.st Bun ks:

- 1. z\cliyut Godbotc. .Finl Khathc: \\'cb Technologies 3.'c. kIcGrav•- H ill Educo tion. \*0 t3.
- 2. Robert \\'. Scbcsta. Promniniin5 the \\'ortd \\'idc s cb. 7-' Edition. Pearson Education.
- 3. Brad Daj lcj. Brendan Daj ly . Calcb Doyle.. Code js. Non oDB and .Angular 5"cb Dm clopnicnt: The definiti c in idc to using the N E \N stack to bu itd web o pplications. Pcarson Education: Second Edition odition. 20. 18.

#### Reference Book.s:

- 1. Paul J. £kutci, Harv(:y ill. Dntci, Abbey Ocncl, , fnterr>ct & World Wide Web H<m' to Program, Plc , Prentice Hall , 20J3
- T. Bodd yr emmwebsite the zzghtway usmg HTML SB, 3zd Edits.
- 2. <u>•//br•oks gwT£Tcker com/N+\*del 'Book/</u> h. •//docsmcmgndb comYznanuaT/tutwaV

# MOOCS

- 1. https://www' mor'c-list com/coursefweb\*develrypment-udaciMstatic=nue
- 2. htips-" w• w monc•list pt•basics
- 3. his-//www' mor'c-list cmrv'course/intro•html-and•css•udaciMstatic=tme

# DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Course Title		Satellite Principles and Applications								
Course Code	19ET8OE3SP	Credits	3	L:T:P	3:0:0					
	UNIT I [8 hours]									

**Introduction to Satellites and Applications:** History of evolution of satellites, Basic principles, Satellite orbits, orbital parameters, Launch vehicles, orbital perturbations, look angles

UNIT II [8 hours]

**Satellites Hardware:** Satellite subsystems, Mechanical structure, Propulsion subsystem, Thermal control subsystem, Attitude and orbit control, Telemetry tracking and command subsystem, Payload, Antenna subsystem

UNIT III [8 hours]

**Communication Techniques:** Types of information signals, AM, FM, Pulse communication, Digital modulation techniques, Multiplexing Techniques, Multiple Access Techniques-FDMA,TDMA,CDMA, Satellite link design fundamentals, Earth station, Networking protocols.

UNIT IV [8 hours]

**Satellite Applications:** Communication satellites, Remote sensing satellites, Weather satellites, Navigation satellites

UNIT V [8 hours]

**Scientific satellites:** satellite based versus ground based scientific Techniques, Applications of scientific satellites-study of earth, Astronomical observations, Military satellites, Emerging trends-Millimeter wave satellite communication, space stations

Unit Choice: Unit I and Unit III

# **TEXT BOOKS:**

**Satellite Technology Principles and Applications: 3rd Edition,** by Anil K Maini, Varsha Agrawal, Publisher: John Wiley & Sons

# **REFERENCE BOOKS:**

- 1. **Satellite Communications:** Dennis Roddy, Tata McGraw Hill
- 2. Satellite Communication: Timothy Pratt, Second Edition, John Wiley and sons.
- 3. **Satellite Communications Systems: systems, techniques and technology**, 5<sup>th</sup> edition, by G. Maral, M. Bousquet, Z. Sun, Publisher: John Willy and sons
- 4. **The Satellite Communication Applications Handbook**, Bruce R. Elbert Artech House, 2004 Technology & Engineering

# **DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING**

Course	Course Outcomes								
CO1	Ability to define, understand and explain concepts of satellite communication system	-							
CO2	Ability to apply the knowledge of communication theory to study the technologies of satellite communication	PO1 (3)							
CO3	Ability to analyse whole/parts of a given satellite communication link	PO2 (2)							
CO4	Ability to function effectively as an individual or as a team member to conduct experiments using hardware and/simulation.	PO5(1) PO9(1)							

# DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Title		CELLULAR NETWORKS								
Course Code	19ET8OE3CN	Credits	3	L:T:P	3:0:0					
	UNIT I [8 hours]									

Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum –IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security—IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT II [8 hours]

Introduction – Mobile IP: IP packet delivery, Agent discovery, 1nalyse1ng and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol – mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

UNIT III [8 hours]

TCP enhancements for wireless protocols – Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility – Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP – TCP over 3G wireless networks.

UNIT IV [8 hours]

Internetworking objectives and requirements, Schemes to connect WLANS and 3G Networks, Session Mobility, Internetworking Architecture for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multichannel Multipoint Distribution System.

UNIT V [8 hours]

Introduction – 4G vision – 4G features and challenges – Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, IMS Architecture, LTE, Advanced Broadband Wireless Access and Services

# **Unit Choice: Unit II and Unit IV**

# **Course Outcomes**

CO1	Ability to <b>understand</b> and <b>explain</b> concepts of cellular networks	
CO2	Ability to <b>apply</b> the knowledge of communication techniques to understand the different cellular technology and solve problems	PO1
CO3	Ability to <b>1nalyse</b> the given parameters for different propagation models of wireless networks	PO2
CO4		PO6
	Ability to perform in a team to prepare a report and make an	PO7
	effective oral presentation of the study on topics related to	PO8
	Networks protocols, contribution of cellular systems to the society	PO9
	and its effect on environment	PO10
		PO12

# DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

# **TEXT BOOKS:**

- Vijay Garg, "Wireless Communications and networking", First Edition, Elsevier 2007. (Unit
- Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.(Unit

# **REFERENCE BOOKS:**

Rappaport, T.S., —Wireless communications ||, Pearson Education, Second Edition Andreas.F. Molisch, —Wireless Communications ||, John Wiley – India, 2006

<b>Course Title</b>		INDUSTRIAL SAFETY AND OCCUPATIONAL HEALTH										
<b>Course Code</b>	1	9 C H 8 O E I S O Credits 03 L-T-P 3-0-0										
CIE		100 marks (50% weightage) SEE 100 marks (50% weightage)									weightage)	

# **SYLLABUS:**

#### **UNIT-I**

**ISO45001**: Scope, Normative references, terms and Definitions, Context of the organization, Leadership and Worker participation, Planning, Support, Operation, Performance evaluation and Improvement. Safety Management System and Regulations Complimenting Safety of People and Loss prevention in Factories. **07 Hrs** 

# **UNIT-II**

**INDIAN LAWS GOVERNING INDUSTRIAL SAFETY:** Factories act, State rules there under building and other construction workers acts and rules, Gas cylinders' rules, Explosives acts, Petroleum act, Static and Mobile pressure vessels (Unfired) rules, Indian Boiler acts and rules.

**EMPLOYEE SAFETY:** Concept of Man-Machine system, Applications of human factors engineering, Human behaviour, Individual difference, Unsafe Action Factors, Personal Factors, Psychological and Psychosocial Factors, Motivation, Frustration and Conflicts, Attitudes and Learning concepts. **Personal Protective Equipment:** Types, specifications, standards, testing procedures, maintenance. **Principles of Ergonomics**: Application of ergonomics in a work system. **10 Hrs** 

#### **UNIT-III**

**PRINCIPLES OF MACHINE GUARDING:** Machine Safety risk assessment, Physical guard assessment and allied Controls.

Guarding during maintenance, Zero Mechanical State (ZMS), Definition.

**POLICY FOR ZMS**: Guarding of hazards - point of operation protective devices, machine guarding, types, fixed guard, interlock guard, automatic guard, trip guard, electron eye, positional control guard, fixed guard fencing, guard construction, guard opening. Selection and suitability to ensure controls. **06 Hrs.** 

# **UNIT-IV**

**INCIDENT REPORTING INVESTIGATION AND ANALYSIS:** Accidents classification and analysis-fatal, serious, minor, and reportable accidents, safety audits, recent development of safety engineering approaches for industrial activity, frequency rates, accident occurrence, investigation, measures for improving safety in factories, cost of accident.

**CORRECTIVE ACTION MANAGEMENT**: Emergency preparedness, disaster management. Periodic Inspection of workplace to validate the operability and availability of Controls designed, initiating actions after conducting root cause analysis. **06 Hrs** 

# **UNIT-V**

ELECTRICAL SAFETY CONCEPTS AND STATUTORY REQUIREMENTS:

Introduction – electrostatics, electromagnetism, stored energy, energy radiation and electromagnetic interference – Working principles of electrical Equipment-Indian electricity act and rules-statutory requirements from electrical inspectorate-international standards on electrical safety – first aid-cardiopulmonary resuscitation (CPR).

**ELECTRICAL HAZARDS:** Primary and secondary hazards— Energy leakage — Clearance and insulation — Excess energy — Current surges — Electrical causes of fire and explosion - ionization, spark and arc-ignition energy — National electrical Safety code - Safety in handling equipment's-over current and short circuit current-heating effects of current-electromagnetic forces-corona effect-static electricity —definition, sources, hazardous conditions, control.

**Protection systems:** fuse, circuit breakers and Personal protective equipment – safety in handling handheld electrical appliances tools and medical equipment's. Lightning, hazards, lightning arrestor, installation – earthing, specifications, earth resistance, earth pit maintenance. **10 Hrs** 

#### **TEXT BOOKS**

- 1. ISO 45001:2018 BSI Standards Publication, 2018.
- 2. K.U. Mistry, Fundamentals of Industrial Safety and Health, 1st Edition, Siddharth Prakashan, 2008

#### REFERENCE BOOKS

- 1. Lees F.P, Loss Prevention in Process Industries, 2<sup>nd</sup> edition, Butterworth Heinemann, 1996
- 2. Trevor Kletz, What Went Wrong? 5th edition, Butterworth Heinemann, 2009

# **E BOOKS**

Charles D. Reese, Occupational Health and Safety Management,
 <u>https://www.routledge.com/Occupational-Health-and-Safety-Management-A-Practical-Approach-Third-Edition/Reese/p/book/9781138749573</u>

#### **MOOC's & ONLINE COURSES:**

1) Health & Safety Training Courses, <a href="https://www.britsafe.org/training-and-learning/find-the-right-course-for-you/all-health-safety-and-environmental-training-courses/">https://www.britsafe.org/training-and-learning/find-the-right-course-for-you/all-health-safety-and-environmental-training-courses/</a>

# **QUESTION PAPER PATTERN:**

- 1. Overall question paper pattern to have seven questions from five units.
- 2. Five questions to be answered.
- 3. One question from each unit.
- 4. One question each from Unit I, III, and IV and two questions each from Unit II and V.

# **COURSE OUTCOMES (COs):**

	COURSE OUTCOMES	Programme
		Outcomes
CO1	Interpret and apply legislative requirements, industry standards, and	PO6
	best practices in the workplace	
CO2	Apply risk management principles to anticipate, identify, evaluate and	PO7
	control occupational hazards	

CO3	Practice due diligence and employ ethical standards in all aspects of professional conduct.	PO8
CO4	Work in a team to achieve Industrial safety engineering goals	PO9
CO5	Communicate effectively the incidents, their investigation and analysis	PO10
CO6	Affect/manage change by advancing safety and health principles	PO12
	within the work environment.	

# **ASSESSMENT:**

Con	tinuous Internal Assessments	Marks 100% (Weightage 50%)	Assessment
Theory	Three Internals (Best of Two)	80%	Course
Component			Instructor
	Quiz (Two Quizzes)	20%	Course
			Instructor
Semester End	<b>Examination (Written Examination for</b>	Marks 1	.00
	Three Hours)	(Weightage	50%)

# ASSESSMENT PATTERN:

Component	Test 1	Test 2	Quiz 1/AAT	Quiz 2 /AAT	Total Marks
Max. Marks	40	40	10	10	100
Reduced CIE	20	20	5	5	50

Course Title		FORENSIC SCIENCE					Credits		3					
Course Code	2	1	В	T	8	I	E	F	R	S	L-T-P	3	0	0

**PRE-REQUISITES:** Knowledge of Human Physiology, Engineering Chemistry and Physics, Biology for Engineers.

# **UNIT 1 INTRODUCTION**

[06 L]

Introduction to Forensics, Definition and scopes of forensics, History and chronology of the events in forensics, (Contribution of various scientists and forensic experts in forensic sciences), and important milestones in the forensics, importance and significance of court in forensics (procedure and protocol:- Inquest and different types, medical examiners systems, powers of courts, different documentary evidences and witness, Doctors guide to court), application of the forensics in various fields.

# UNIT 2 CRIME LAB & THE CRIME SCENE

[10 L]

Crime lab: Organization of crime lab at various levels in India (Center and State), Basic services provided by full service crime laboratories (physical, biological unit, firearms unit, Document Examination unit, photograph unit, - functions and duties), optional services provided by full service crime laboratories (lie detector, toxicology, voice print analysis unit). The Crime Scene: Processing the crime scene (Crime scene, Preservation and record, methodic search for evidence, Collection and package of the evidences, maintain chain of custody, crime scene safety).

Physical evidences: common types & sources of physical evidences, Handling, packing and labeling of evidence, Individual and class characteristics, significance of physical evidences.

# **UNIT 3 FORENSIC ANALYSIS**

[10 L]

Glass (nature of information obtained, properties, glass fractures, collection and preservation of glass evidence); Soil (forensic characteristics, collection and preservation); Hairs (Morphology, Identification and comparison, collection), Fibers (Types, Identification), semen, paint (collection, nature & examination), Blood (stain patterns, preservation, characterization). Selecting an analytical technique to identify a organic substance (Gas Chromatography, High Performance Liquid Chromatography, Thin Layer Chromatography, Electrophoresis)

# **UNIT 4 FORENSIC BIOLOGY**

[08 L]

Forensic Pathology (Rigor mortis, Lovor mortis, Algor mortis); Forensic Anthropology, Forensic Entomology, Forensic Psychiatry, Forensic odontology, Forensic Engineering, DNA Analysis, Finger prints (Classification and patterns, ridge characteristics, Methods of detecting fingerprints).

# **UNIT 5 COMPUTER CRIME & ETHICS IN FORENSICS**

[05 L]

Computer crime: Introduction and definition, classification (Physical, Data & software related), computer crime prevention measures, overview of cyber forensics.

Ethics in forensic science: Introduction, The importance of professional ethics to science practitioners, Various models of codes of ethics (broad model and Detailed model), How ethical requirement, impact the daily work of a forensic scientist, ethical dilemmas and their resolution.

# PRIMARY REFERENCE BOOKS

- 1. Criminalistics: An Introduction to Forensic Science by Richard Saperstein, Prentice Hall, 2001.
- 2. Forensic Science in Crime Investigation by B.S.Nabar, Asia Law House, 3rd edition, 2007

# SECONDARY REFERENCE BOOKS

- 1. Principles of Forensic Medicine by Apurba Nandy, New central book agency (p) Ltd.
- 2. M.K.R.Krisnas's Handbook of Forensic Medicine including Toxicology by V. P. Patnaik, Pras Medical Books, 11th edition, 1999.

# **COURSE OUTCOMES**

By the end of the course, students should be able to:

- 1. Comprehend the basic concepts of forensic sciences viz., legal procedure and protocols required to solve cases and ethics involved in forensic sciences.
- 2. Apply the concepts of forensic sciences to solve criminal cases. (PO1)
- 3. Analyze the crime scenes and physical evidences based on the nature of evidences. (PO2)
- 4. Identify a suitable case study, prepare a report and communicate effectively. (PO2, PO10)

Course Title	BIOMETRICS	Course Code	19ML8OE3BM
Credits	3	L-T-P	3-0-0

**CO1:** Ability to apply knowledge of mathematics, science and engineering to understand the concepts of Biometrics.

**CO2:** Ability to analyze and select a methodology of Biometrics.

**CO3:** Ability to interpret Biometric concepts & analysis to be used in relevant application.

**CO4:** Implement the concept for certain identified application, document and present the same.

# UNIT I

INTRODUCTION [7 Hours]

Person Recognition, Biometric Systems, Enrolment and recognition phases, Sensor module, Feature extraction module, Database module, Matching module, Biometric Functionalities, Verification, Identification, Biometric System Errors, Performance measures, The Design Cycle of Biometric Systems, Nature of the application, Choice of biometric trait, Data collection, Choice of features and matching algorithm, Evaluation, Applications of Biometric Systems, Security and Privacy Issues.

#### **UNIT II**

# **FINGERPRINT RECOGNITION**

[8 Hours]

Introduction, Friction Ridge Pattern, Features, Formation, Fingerprint Acquisition, Sensing techniques Image quality, Feature Extraction, Ridge orientation and frequency estimation, Singularity extraction, Ridge extraction, Minutiae extraction, Matching, Alignment, Pairing minutiae, Match score generation, Latent fingerprint matching, Fingerprint individuality, Performance evaluation Fingerprint Indexing, Fingerprint Synthesis, Level 1 feature synthesis, Level 2 feature synthesis, Palm print, Palm print features Palm print recognition in forensics, Palm print recognition for access control.

# **UNIT III**

# FACE RECOGNITION [8 Hours]

Introduction, Psychology of face recognition, Facial features, Design of a face recognition system, Image Acquisition, 2D Sensors 3D Sensors, Video sequences, Face Detection, Viola-Jones face detector, Feature Extraction and Matching, Appearance-based face recognition, Model-based face recognition, Texture-based face recognition, Performance evaluation, Advanced Topics, Handling pose, illumination, and expression variations, Heterogeneous face recognition, Contents xv, Face modelling.

# **UNIT IV**

IRIS RECOGNITION [8 Hours]

Introduction, Design of an Iris Recognition System, Image Acquisition, Iris Segmentation, Segmentation using the integro-differential operator, Segmentation using Geodesic Active Contours (GAC), Generating iris masks, Iris Normalization, Iris Encoding and Matching, Iris Quality, Quality assessment techniques, Performance Evaluation.

#### **UNIT V**

# **MULTIBIOMETRICS, SECURITY SYSTREMS**

[8 Hours]

Introduction, Ear detection, Ear recognition, Challenges in ear recognition, Gait, Feature extraction and matching, Challenges in gait recognition, Hand Geometry, Image capture, Hand segmentation, Feature Extraction, Feature matching, Challenges in hand geometry recognition, Soft Biometrics, Sources of Multiple Evidence, Acquisition and Processing Architecture, Fusion Levels, Adversary Attacks, Insider attacks, Infrastructure attacks, Attacks at the User Interface, Impersonation, Obfuscation, Spoofing, Countermeasure: spoof detection, Attacks on Biometric Processing, Attacks on the system modules, Attacks at the interconnections, Attacks on the Template Database, Countermeasure: biometric template security.

#### **Text Books:**

1. Introduction to Biometrics by Anil K. Jain, Arun A. Ross, Karthik Nandakumar. Springer Publications.

# **Reference Books:**

- 1. Biometrics- The Ultimate Reference- John D. Woodward, Jr. Wiley Dreamtech.
- 2. Personal Identification in Networked Society, Jain, A.K.; R Bolle, Ruud M.; S Pankanti, Sharath, 1<sup>st</sup> ed. 1999. 2nd printing, 2006, Springer Publications.
- 3. Handbook of Biometrics, Jain, Anil K.; Flynn, Patrick; Ross, Arun A, Springer, 2008.

# **MOOC Links:**

- 1. https://nptel.ac.in/courses/106/104/106104119/
- 2. https://www.coursera.org/lecture/usable-security/biometric-authentication-RXVog

**UNIT Choice: Unit 2 and Unit 3** 

Course Title	SMART SENSORS AND ANA	SMART SENSORS AND ANALYTICS									
Course Code	19EI8OE3SA	Credits	3	L-T-P	3:0:0						
CIE	100 Marks (50% weightage)	SEE	100	Marks (50	% weightage)						
UNIT-I					7 Hours						

#### **Sensor Fundamental:**

Introduction, sensor classification, Thermal sensor, Humidity sensor, Capacitive sensor, Planar interdigital sensor, Planar electromagnetic sensor, Light sensing Technology, Moisture sensing Technology, CO<sub>2</sub> sensing technology, sensor parameters, selection of sensors.

UNIT-II	8 Hours
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# **Interfacing of Sensors and Signal Conditioning:**

Change of Bias and Level of Signals, Loading Effect on Sensor's Output, Potential Divider ,Low-Pass RC Filter High-Pass RC filters ,Practical Issues of Designing Passive Filters Op-Amp Based Instrumentation Differential Amplifier Common Mode Rejection Single-Resistance Controlled Instrumentation Amplifier Current-to-Voltage Converter Comparator , A Few Guidelines to Design Signal Conditioning Circuit, Factors Affecting Performance of Sensors, Effect of Temperature ,Degradation of Sensors

UNIT-III 8Hours

# Wireless Sensors, Sensors Network and Power Supplies for Sensors

Introduction ,Frequency of Wireless Communication , Development of Wireless Sensor Network Based Project, Wireless Sensor Based on Microcontroller and Communicating Device ,Wireless Sensor Network Based on Microcontroller and ZigBee Communicating Device ,Wireless Sensor Network Based on Only ZigBee , Power Sources ,Power from Mains Supply . Selection of Batteries, ,Energy Harvesting Solar Energy, Wind Energy RF Energy Harvesting ,Energy Harvesting from Vibration, Thermal Energy Harvesting, Energy Management Techniques

UNIT-IV 8 Hours

# **Sensors Signal Processing Techniques**

Introduction ,A Brief Review of Signal Processing Techniques for Structural Health Monitoring ,Normalization Feature Extraction , Dimensionality Reduction ,Collaborative Damage Event Detection (CBED) Method ,Signal Processing Techniques for Information Extraction from Sensor Data ,Deriving Information from Sensor Data: Daily Activity Recognition Models, The Hidden

Markov Model (HMM), Emerging Patterns (EP), Finding Patterns in Sensor Data, Classifying Sensor Data, Detecting Trends, Characterizing Sensor Data

UNIT-V 8 Hours

# Introduction to Machine learning in wireless Sensor Networks: Algorithms, strategies and applications:

Introduction to machine learning in wireless sensor networks, Supervised Learning- K-nearest neighbour, Decision tree, Neural networks, Support vector machines ,Bayesian statistics, Unsupervised Learning- K-means clustering, Principal component analysis, Reinforcement Learning, functional challenges, non-functional challenges, miscellaneous applications, future applications of machine learning in wireless sensor networks

# **CASE STUDIES:**

- 1. Measurement of Human Body Temperature
- 2.Intelligent Sensing System for Emotion Recognition
- 3.WSN Based Smart Power Monitoring System

# **Text books:**

- 1. "Intelligent Sensing, Instrumentation and Measurements" Subhas Chandra Mukhopadhyay, Springer
- 2. "Wireless Sensor Networks" Hossam Mahmoud Ahmad Fahmy, Springer Singapore
- 3. "Data Acquisition and Signal Processing for Smart Sensors", Nikolay V. Kirianaki,
  Sergey Y. Yurish, Nestor O. Shpak (Author), Vadim P. Deynega, John Wiley & Sons, Ltd

#### Reference books:

- 1. "Smart Sensor Systems", Emerging Technologies and applications, Gerard Meijer, Kofi Makinwa, Michiel Pertijs, John Wiley & Sons
- 2. ''Handbook of Wireless Sensor Networks: Issues and Challenges in Current Scenarios'' Singh P.K., Bhargava B.K., Paprzycki M., Kaushal N.C., Hong W C, Springer
- "Machine Learning in Wireless Sensor Networks: Algorithms, Strategies, and
   Applications", Mohammad Abu Alsheikh, Shaowei Lin, Dusit Niyato and Hwee-Pink Tan,
   IEEE Explore- IEEE Communications Surveys & Tutorials

# **E- References:**

- 1. <a href="https://onlinecourses.swayam2.ac.in/arp20\_ap41/preview">https://onlinecourses.swayam2.ac.in/arp20\_ap41/preview</a>
- **2.** https://nptel.ac.in/courses/108/108/108108147/

Internal choice: Unit – III & IV

# **Course outcomes**

At the end of the course, the student will have the ability

**CO1:**To understand and explain the basic knowledge of sensors used for making wireless sensors or smart sensors

**CO2:**To relate the issues of interfacing sensors to a processor and signal conditioning.

CO3:To analyze interaction among different components and importance of developing of WSN, a power supply and different energy harvesting techniques

**CO4:** To use few signal processing techniques for analyzing the sensors data.

**CO5:** To choose Machine learning implementation strategies and the configuration of a sensor node and the coordinator.

**CO6:** To make a report on case studies and make presentation

Course Title	AUTOMOTIVE INSTRUMENTATION					
Course Code	19EI8OE3AU Credits 3 L-T-P 3:0:0					
CIE	100 Marks (50% weightage)	SEE	100 N	Marks (50%)	weightage)	
UNIT-I					8 Hours	

# **Electric and Hybrid Electric Vehicles**

Configuration of Electric Vehicles, Performance of Electric Vehicles, Traction motor characteristics, Tractive effort and Transmission requirement, Vehicle performance, Tractive effort in normal driving, Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains.

UNIT-II	8 Hours
0111-11	0 110018

# **Energy storage for EV and HEV**

Energy storage requirements, Battery parameters, Types of Batteries, Modelling of Battery, Fuel Cell basic principle and operation, Types of Fuel Cells, PEMFC and its operation, Modelling of PEMFC, Supercapacitors.

UNIT-III 7 Hours

**Mechatronics:** Mechatronic systems and components, development methods, outlook.

**Control units:** Operating conditions, design, data processing, digital modules in the control units, control unit software,

UNIT-IV 8 Hours

**Automotive sensors:** automotive applications, details of the sensor market, sensor classification, Engine Crankshaft Angular Position Sensor, Magnetic Reluctance Position Sensor, Hall effect Position Sensor, Shielded Field Sensor, , Engine Coolant Temperature (ECT) Sensor, Lambda Sensors

Actuators: Solenoid, Fuel Injector, EGR Actuator, Ignition System

UNIT-V 8 Hours

# **Power Electronic Converter for Battery Charging**

Charging methods for battery, Termination methods, charging from grid, The Z-converter, Isolated bidirectional DC-DC converter, Design of Z- converter for battery charging,

	, 6
Text	books:
1	Automotive electrics Automotive electronics, 5th edition, Robert Bosch GmbH.
2	William B.Ribbens, "Understanding Automotive Electronics", 6th Edition, Elsevier Publishing.
3	Robert Bosch Gmbh (Ed.) Bosch Automotive Electrics and Automotive Electronics Systems and Components, Networking and Hybrid Drive, 5th edition, John Wiley& Sons Inc., 2007.

4	Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and
4	Design M. Ehsani, Y. Gao, S. Gay and Ali Emadi CRC Press 2005
5	Electric and Hybrid Vehicles: Design Fundamentals Iqbal Husain CRC Press 2003
Refer	rence books:
1.	Understanding Automobile electronics, William B Ribbon, 6th Edition, 2003 Elsevier
	Science
E- Re	eferences:
1.	https://www.etf.ues.rs.ba/~slubura/Mehatronicki%20sistemi%20kod%20motora%20i
	%20vozila/Literatura/understanding%20automative%20electronics.pdf
2.	https://instrumentationtools.com/instrumentation-books-download/
e-Lea	urning:
1	https://swayam.gov.in/NPTEL
2	https://www.udemy.com/topic/automobile-engineering/
Inter	nal choice: Unit – IV & V
Cour	rse outcomes
At the	e end of the course, the student will have the ability
CO1	Know the working OPS, ABS, ACC and TCS in gasoline and diesel engines
	: Analyze the architecture and role of electronic components in a vehicle
CO <sub>3</sub>	Determine the functions of control units and mechatronics in an automobile engineering
CO4	: Analyze the requirement of sensors and actuators for automobile applications
CO5	Describe the working of various sensors used in automotive electronics



# BMS COLLEGE OF ENGINEERING, BENGALURU-19

# Autonomous Institute, Affiliated to VTU

#### INSTITUTIONAL ELECTIVE OFFERED BY THE DEPARTMENT OF CHEMISTRY

Course Name	Industrial Engineering	Course Code	19CY8IEIEM
	Materials		
Credits	03	L-T-P-S	3- 0 -0-0
Contact hours	40	Course Instructor	Dr.Srinidhi Raghavan.M

# **Course Objectives:**

# The fundamental of the course is to:

- ❖ Deliver basic knowledge of Engineering Materials
- ❖ Demonstrate the importance of materials in Industrial Engineering prospective
- ❖ Brief about the techniques and analysis to make new type of materials
- Instruct significance of materials quality and its applications in Industrial aspects

A	Course Outcomes: At the end of the course the student will	POs	Strength of
	have	Mapped	mapping
CO1	An ability to understand the importance of materials in		
	Industrial prospective		
CO2	To apply the learnt knowledge and select suitable materials for		
	specific applications		
CO3	Develop the skill to solve the material related glitches in		
	Industrial aspects		

#### Unit – I

**Engineering materials**: Introduction, classification and properties and applications of Engineering materials: Glass, Refractories, Abrasives, Insulating materials, and nanocomposites, Lubricants and Biomaterials. **Glass:** Properties of Glass-Physical and Chemical properties – Devitrification- Causes and preventions – Manufacture of glass- - Types of glasses - Preparation of Silica glass and its properties. Application of Glass in Industrial prospective. **(8 hours)** 

#### **Unit-II**

**Refractories**: Introduction, Classification and characteristics – Manufacturing of refractories –Silica bricks (Acidic refractories) and Fireclay refractories- Seger cone test –refractoriness under load- Thermal expansion and contraction-Chemical inertness- Thermal conductivity- Abrasion and erosion. Failure of a refractory materials and it is applications. **Abrasives:** Introduction–Properties–Classifications and applications.

(8 hours)

# **Unit-III**

**Insulating Materials:** Introduction – Properties- Factor affecting insulation Resistance-Electrical Insulators – Importance of electrical insulators and its applications. **Semiconductor materials:** Introduction-types and Classifications-Applications. **(8 hours)** 

#### **Unit-IV**

**Sensors:** Introduction – Classifications-Solid state sensors – Electrochemical sensors- Biosensors– Monitoring Sensors-with examples and applications- Types of Sensors (Temperature, IR, UV, Touch and proximity sensors) – Principle and working and applications.

**Biomaterials**: Introduction- Bioactivity- Structural Hierarchy-Self-assembly – Biocompatibility- Biopolymers- Applications. **(8 hours)** 

# **Unit-V**

**Lubricants:** Introduction- Functions of lubricants- Types of lubricants- Classification of lubricants (Liquid – Semisolid – solid)- Synthetic lubricant. Properties of lubricants (viscosity – Flash and fire point)- Applications of lubricant in industrial prospective. **(8 hours)** 

# **Text Books:**

- 1. Materials Science and Engineering (A first course by Raghavan V.)
- 2. Material Science and Metallurgy (U.C. Jindal, Indian Edition)

# **Reference Books:**

- 1. Engineering Chemistry by Shikha Agarwal. Edition: 6th Edition, 2018. Publisher: Cambridge.
- 2. Materials Science and Engineering by R. Balasubramaniam: 2<sup>nd</sup> Edition. Publisher: Wiley.

MOOCS: https://nptel.ac.in/courses/112/108/112108150/

# **Scheme and evaluation:**

Component	Type of assessment	Max. Marks		Weightage	Total	Total Marks
	Quiz 1	10		10		
	Quiz 2	1	10	10	ı	
CIE - Theory	Test 1	40	Best		50*	50 (CIE)
	Test 2	40	of	40	30	30 (CIL)
	Test 3	40	Two test			
SEE	End Exam	1	00	50		50 (SEE)
Grand Total Marks						100
* minin	num CIE marks (Theor	$y) \ge 10.$	0 to gain	eligibility to	write the	SEE

# INSTITUTIONAL ELECTIVE OFFERED BY THE DEPARTMENT OF CHEMISTRY

Course Name	Corrosion Science & Engineering	Course Code	17CY8IECSE
Credits	03	L-T-P-S	3- 0 -0-0
Contact hours	40	Course Instructor	Dr.Kalyan Raj

# **Course Objectives**

- > Study of corrosion principles and their role in understanding different types of corrosion problems
- > To gain the knowledge of types of corrosion in applying corrosive techniques to protect faster corrosion and monitoring of corrosion.
- > Study of corrosion and different forms of corrosion to understand the failure of metal structures.
- Explore the different corrosion testing methods to measure the corrosion rate.
- > To understand various techniques involved in design rules, coatings and other techniques in corrosion control.

CO. NO	COURSE OUTCOMES	POs	Strength of
	At the end of the course the student	Mapped	mapping
	will have		
CO 1	An ability to understand and Explain		
	corrosion principles and various forms		
	of corrosion and its monitoring and		
	corrosion control		
CO 2	An Ability to apply the learnt		
	knowledge in testing, monitoring and		
	control of various forms of corrosion		
CO 3	An ability to develop methods of		
	science and engineering in testing,		
	monitoring and control of various		
	forms of corrosion		

# <u>SYLLAB</u> US:

# Unit - I

**Corrosion Principles**: Introduction, definition, environment. Corrosion damage. Classification, electrochemical reactions. Polarization passivity. Faradays laws of electrolysis, application, and problems. Thermodynamics: Free energy change. Electrode potentials, e.m.f Nernst equation. Environmental effects. Effect of O<sub>2</sub>, oxidizer, velocity, temperature. Corrosion concentration, galvanic coupling. Metallurgical aspects. Numericals.

8hrs

#### Unit – II

**Types of corrosion-1**: Uniform attack, galvanic corrosion, definition, Galvanic series, environmental effects, distance and area effect. Prevention, crevice corrosion, definition, environmental effects, mechanism. Filiform corrosion, mechanism, prevention, definition, environmental effects. Pitting corrosion, mechanism, prevention, definition, environmental effects. Solution composition, velocity, evaluation of damage, prevention. Inter granular corrosion, definition, austenite SS. Weld decay. Control for austenite SS, knife line attack. Selective leaching. Dezincification. Type's mechanism, prevention.

# Unit - III

**Types of corrosion-2:** Erosion corrosion: definition, effect of surface film Velocity of environment, impingement, galvanic effect control of erosion corrosion. Cavitation damage. Fretting corrosion. Wear-oxidation and oxidation – wear mechanisms. Corrosion fatigue, definition, environmental factors, mechanism. Hydrogen damage, prevention, classification. **8hrs** 

# Unit - IV

Corrosion testing and monitoring: Introduction, classification. Purpose of corrosion testing, materials, specimen. Surface preparation, measuring and weighing. Types of testing, lab, pilot plant and field tests. Measurement of corrosion rate, weight loss method. Electrochemical methods, Tafel extrapolation. Linear polarization method, cleaning specimen after exposure. Effect of temperature, std. expression for corrosion rate. Application, numericals.

8hrs

# Unit - V

Corrosion control: Selection of materials, alteration of environment, temperature. Medium, velocity, removal of oxygen. Design, wall thickness, design rules. Cathodic protection, principles, procedure. Anodic protection, principle procedure, comparison. Metallic and other inorganic coatings, Cladding, vapour phase deposition, diffusion, chemical conversion coating. Surface modification, organic coating. Corrosion inhibitors.

8hrs

# **Text Books:**

1. M.G. Fontana, Corrosion Engineering, Tata McGraw-Hill Edition 2005

# **Reference Books:**

- 1. Engineering Chemistry by B.K.Sharma. Edition: 6th Edition, 2011. Publisher: Krishna Prakashana Media (p) Ltd.
- 2. Electrochemistry and corrosion science, Nestor Perez, Springer (India) pvt.Ltd. 2004
- 3. Principles and prevention of corrosion, D.A.Jones, Macmillan Publ.Co. (1996)
- 4. Corrosion Handbook, Electrochemical society series. John Wiley and sons. (2000)

# MOOCs:

#### https://www.mooc-list.com/tags/engineering

www.mooc-list.com/.../materials-and-materials-processing-saylororg

#### Scheme and evaluation:

Component	Type of assessment	Max. Marks		Weightage	Total	Total Marks
	Quiz 1	10		10		
	Quiz 2	10		10		
CIE - Theory	Test 1	40	Best		50*	50 (CIE)
CIL THEOLY	Test 2	40	of	40		30 (CIL)
	Test 3	40	Two	40		
	Test 5	40	test			
SEE	End Exam	1	00	50		50 (SEE)
	Grand Total Marks 100					100
* minin	* minimum CIE marks (Theory) ≥ 10.0 to gain eligibility to write the SEE					



# BMS COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

#### DEPARTMENT OF MATHEMATICS

# **SYLLABUS (2021 - 2022)**

# **EIGHTH SEMESTER – INTITUTIONAL ELECTIVE - (Except CSE/ISE Branch)**

Course Title	Linear Algebra	Course Code	21MA8IELIA
Credits	03	L-T-P	3-0-0
Contact hours	36 hours		

**Prerequisites:** Vector Algebra, Matrix theory, Calculus, Geometry, Group Theory.

**Course Objectives:** To provide the students with a foundation of concepts in linear algebra that is essential to engineers of computer and information science.

#### UNIT-1

VECTOR SPACES [7 hours]

Vector spaces, Subspaces, Linear Combinations, Linear Spans, row space and column space of a Matrix, Linear Dependence and Independence, Basis and Dimension, Coordinates.

#### **UNIT-2**

# LINEAR TRANSFORMATIONS

[7 hours]

Introduction, Linear Mappings, Geometric linear transformation of  $\mathbb{R}$ , Kernel and Image of a linear transformations, Matrix representation of linear transformations, Rank-Nullity Theorem(No proof), Singular and Nonsingular linear transformations, Invertible linear transformations.

#### **UNIT-3**

# EIGENVALUES AND EIGENVECTORS

[8 hours]

Introduction, polynomials of matrices, characteristic polynomial, Cayley-Hamilton theorem, eigenvalues and eigenvectors, eigen spaces of a linear transformation, diagonalization, minimal polynomial, characteristic and minimal polynomials of block matrices, Jordan canonical form.

#### **UNIT-4**

# INNER PRODUCT SPACES

[7 hours]

Inner product, inner product spaces, length and orthogonality, orthogonal sets and Bases, projections, Gram-Schmidt process, QR-factorization, least squares problem and least square error.

#### **UNIT-5**

# SYMMETRIC MATRICES AND QUADRATIC FORMS

[7 hours]

Diagonalization of real symmetric matrices, Orthogonal diagonalization of real symmetric matrices, quadratic forms and its classifications, Singular value decomposition.

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

Course Code	CO#	Course Outcome (CO)	РО
	CO 1	Apply the concepts of Matrices to Vectors spaces.	
21MA8IELIA	CO 2	Relate the concepts of Eigen values, Eigen vectors & functions to linear algebra.	1
	CO 3	Apply the concepts of inner products.	

# **Text Books:**

- 1. Linear Algebra and its applications, David C. lay, Steven R. lay, Judi J Mc. Donald, 5<sup>th</sup> Edition, 2015, Pearson Education.
- 2. Linear Algebra and its applications, Gilbert Strang, 4<sup>th</sup> edition, 2005, Brooks Cole.

# **Reference Books:**

- 1. Schaum's outline series-Theory and problems of linear algebra, Seymour Lipschutz, 5<sup>th</sup> edition, 2012, McGraw-Hill Education.
- 2. Linear Algebra an Introduction, Richard Bronson & Gabriel B. Costa, 2<sup>nd</sup> edition.

# E books and online course materials:

- 1. https://ocw.mit.edu/courses/mathematics/18-06sc-linear-algebra-fall-2011/index.htm
- 2. https://www.math.ucdavis.edu/~linear/linear.pdf

# **Online Courses and Video Lectures:**

- 1. https://www.coursera.org/learn/linear-algebra-machine-learning
- 2. https://nptel.ac.in/syllabus/111106051/

# **Question Paper Pattern:**

- 1. Five full questions to be answered.
- 2. To set one question each in Units 1, 2, 5 and two questions each in Unit 3 and Unit 4.

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# BMS COLLEGE OF ENGINEERING, BASAVANGUDI

# **Department of Management Studies & Research Centre**

# OPEN ELECTIVE FOR 8th SEMESTER B.E.

Course	PERSONAL FINANCE	Course Code	20MB8OE3PF	SEE Duration	3 Hours	Total No. of
Credits	03	L-T-P hours	3-0-0	SEE+ CIE	50 + 50	Lecture Hours 39

UNIT I (4 Hours)

# **Planning personal Finances**

Planning Personal Finance, Career Planning, financial aspects of career planning. Financial benefits offered by employers in India. Concept of Time value of Money

UNIT II (9 Hours)

# **Managing Personal Finances**

Saving vs investing, Savings Schemes in India.

Personal loans and Educational Loans: sources and comparison.

Introduction to consumer credit: Choosing a source of credit: the costs of credit alternatives.

Consumer purchasing strategies and Legal Protection

Housing Finance decision: Factors, sources and comparison. Tax implications.

UNIT III (6 Hours)

# **Insuring resources**

Life Insurance schemes, Premium calculation, ULIPS.

General Insurance – Property Insurance, Motor vehicle Insurance, Health and Medical Insurance – various schemes, miscellaneous insurance.

Tax implications of insurance schemes.

UNIT IV (14 Hours)

# **Investing**

Investing in stocks and Bonds-benefits and risks. Tax implications of investing in Stocks and bonds. Investing in Mutual Funds – Types, benefits, risks. ULIPS vs Mutual funds.

Investing in Real Estate and Gold – benefits, risks. Tax implications of investing in mutual funds, gold and real estate.

UNIT V (6 Hours)

Investment portfolio planning for individual investors.

Planning personal tax strategy

Retirement planning and Estate planning, Wealth Management as a profession.

**Course Outcomes:** Upon completion of the course student will have the ability to

CO1	Ability to evaluate various savings plans, consumer credit and purchasing decisions
	including housing

CO2	Ability to take Life and General Insurance subscription decisions
CO3	Ability to analyze retirement plans and estate planning mechanisms
CO4	Ability to plan personal investment, portfolio and tax planning

# **RECOMMENDED BOOKS:**

- 1. Personal Finance: Jack R Kapoor, Les R Dlabay, Robert J Hughes, 8th Edition, Mc Graw Hill.
- 2. Investment Analysis and Portfolio management Prasanna Chandra, 3/e, TMH, 2010.
- 3. Risk Management and Insurance, Scott E Harrington, Gregory R Niehaus, 2007, THM
- 4. Insurance and risk Management", P K Gupta, 2010, Himalaya Publishing House

# REFERENCE BOOKS

- 1. The New Wealth Management: The Financial Advisor's Guide to Managing and Investing Client Assets, Harold Evensky, Stephen M. Horan, Thomas R. Robinson, Roger Ibbotson
- 2. Personal Finance and Investments: A Behavioral Finance Perspective, Keith Redhead.

Electives for the Engineering Department

**PROPERTY LAW** 

**OBJECTIVE** 

The focus of this course in on the study of the concept of Property', the 'nature of property rights and the general principles governing the transfer of property. The course is designed to enable engineering students to understand the basic philosophy of property law and its nuances. It introduces them to the modes of transfer and their ramifications. Property Law and issues pertaining to them. Identify and describe the scope and ambit of the property laws in India. To

trace out and understand the theoretical foundation related to property.

<u>UNIT -I</u>

General principles of Transfer of Property Act, objectives of the TP ACT, Concept and meaning of immovable property, Transferable Immovable Property. Persons Competent to transfer Operation of Transfer Conditions restraining alienation and restrictions repugnant to

the interest created.

UNIT- II

Sale, Essential features, Mode of Sale, Rights and liabilities of parties.

UNIT- III

Mortgages of Immovable property: Definition- Kinds of mortgages and their features. Rights and liabilities of mortgagor and mortgages. Priority of securities. Marshalling and contribution- Charges.

<u>UNIT – IV</u>

Law of Taxation: Income, Agricultural Income, Causal Income, Assessment Year, Gross Total Income, Total Income; Tax Evasion, Tax Avoidance, Tax Planning. Scope of Total Income;

# Electives for the Engineering Department

Residence and Tax Liability. Salaries, Capital Gains and income from other resources. HUF and Firm. Brief overview of Tax management and Administration.

# UNIT - V

Economics and Law: Economic theory of property rights; Intellectual property rights and privacy; property rights in broadcasting rights and Airwave auctions; Incompatible Uses and right to future uses; Economics Forest rights of forest dwellers; Pollution: Nuisance and easement approaches; Public land, trespass, eminent domain and valuation of property damages during "bandh"

#### REFERENCES.

- 1. Tripathi, G.P., The Transfer of Property Act
- 2. Cooter, Robert, and Thomas Ulen. Law & Economics
- 3. Veljanovski, Cento. Economic Principles of Law,

# Note:

- 1. Syllabus have been drafted for Engineering electives. The course teacher shall narrow down explanation as per the requirements.
- 2. References mentioned are not exhaustive. The course teacher shall include the books considering the requirements of the students.

# **Department of Computer Applications**

		8th Semester	
Course Title:	Programming using Java	CIE - 50 M	SEE – 50 M
Course Code:	21CA8OE1JP		
L-T-P:	3-0-0	Total Credits:	3

Prerequisites: None

#### UNIT 1:

Basics Concepts of Object-Oriented Programming, Java history, Java Features, Java Support Systems, Java Environment, Java Program Structure, Implementing Java Program, Simple java Program, More of Java, An Application with Two Classes, Keywords, Command Line Arguments, constants, variables and Data types, Operators and Expressions, Decision Making and Branching, Decision Making and Looping, Arrays.

#### UNIT 2:

**Classes, Objects and Methods:** Introduction, Defining a Class, Fields Declaration, Methods Declaration, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Methods, Nesting of Methods, Inheritance: Extending a Class, Visibility Control, Overriding Methods, Final Variables and Methods, Final Classes, Abstract Methods and Classes.

#### UNIT 3:

**Interfaces: Multiple Inheritance:** Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables,

**Packages:** Introduction, **Java** API Packages, Naming Conventions, Creating Packages, accessing a Package, using a Package, adding a class to a package, Hiding classes, Static Import

#### UNIT 4:

**Managing Errors and Exceptions:** Introduction, Types of Errors, Exceptions, Syntax of Exception Handing Code, Multiple Catch Statements, Using Finally Statement, Throwing our Own Exceptions.

**Applet Programming:** Introduction, How Applets differ from Applications, Preparing to Write Applets, Building Applet Class, Applet Life Cycle, Creating and Executing Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet.

# UNIT 5:

Graphics Programming: Introduction, The Graphics Class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Drawing Bar Charts, Introduction to AWT Package.

#### **Text Books:**

1. E. Balagurusamy, Programming with Java, A Primer, Fourth Edition, Mc Graw Hill, 6<sup>th</sup> edition, 2019.

# Reference Books:

- 1. Herbert Schildt, "Java The Complete Reference", 11thEdition, Comprehensive Coverage of Java Language, Oracle Press, McGraw Hill Education (India Edition) 2019.
- 2. Hari Mohan Pandey, "Java Programming", 1stImpression, Pearson, 2012
- 3. T V Suresh Kumar, B Eshwara Reddy, P Raghavan, "Programming with Java", Sanguine Technical Publishers, 2011.

# **Course Outcomes:**

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

CO1	Explain the concepts of Java Programming	
CO2	Apply Java concepts to solve given problem.	PO1(2)
CO3	Develop GUI's for a given scenario using Java Libraries	PO2(1)

# Assessment process:

Tool	Remarks	Marks
Internals	TWO	40
QUIZ		
Lab Component		-
Alternate Assessment Tool ONE		10
Total		50

# **Alternative Assessment Evaluation Rubrics:**

Criteria	Excellent	Good	Unsatisfactory
Design and Implementation of Program	Design and develop Program using appropriate Java Concepts as perthe given scenario (5)	Moderately Design and Develop Program using appropriate Java concepts accordance to the given problem (3)	Adequate Design and develop Program using appropriate Java Concepts asper given scenario(1),
Viva-Voce	Able to Answer all Viva Questions of the java concepts (2)	Able to Answer few Viva Questions of the java Concepts(1)	Able to Not Answer Viva Questions of the java Concepts(0)
Documentation	Well written and neatly organized Report showing proper Input and Output (3).	Well written and neatly organized Report without showing proper Input and Output (2).	Not Well written and not neatly organized Report without Input and Output (1).

# **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks.
Unit-2	Mandatory	One Question to be asked for 20 Marks.
Unit-3	Mandatory	One Question to be asked for 20 Marks.
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each.
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each.

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	30%
Apply	50%
Analyse	20%