



B.M.S. COLLEGE OF ENGINEERING BENGALURU
Autonomous institute affiliated to VTU

**SYLLABUS FOR OPEN ELECTIVE COURSES
(6TH 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 re-register for the same course or a different elective course.

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



B. M. S. COLLEGE OF ENGINEERING, BENGALURU
DEPARTMENT OF CIVIL ENGINEERING

Course	Mechanics of FRP composites	Course Code	20CV6OEMFC	SEE Duration	3 hours
Credits	03	L:T:P	3:0:0	Theory	50 M
Contact hours	36 hours	Lab Contact Hours	-	SEE+ CIE Marks	50+50 M

Course Objectives:

1. Understand the basic properties and manufacturing process along with their application in various industries for different types of composites.
2. Understand the behavior of constituents in the composite materials.
3. Develop the students skills in understanding the different manufacturing methods available for composite material.
4. Demonstrate the knowledge and analysis skills in applying basic laws in mechanics to the composite materials.

Course Outcomes: An ability to

CO1: Identify different composite materials based on the composition and structure of the composite

CO2: Analyze the composites for their mechanical properties based on macro-mechanical behavior

CO3: Formulate constitutive matrix in terms of coupling between extension- shear-bending and twisting terms of Composite laminates based on Kirchoff's hypothesis and propose different laminate types.

CO4: Develop computational programme by using MATLAB.

UNIT -1

Introduction to composite materials: Definition, classification and characteristics of composite Materials – fibrous composites, laminated composites, particulate composites.

Constituents of composite materials: Reinforcements, Matrix, Coupling agents, coatings & fillers.

Reinforcements: Introduction, Glass Fibers, Boron Fibers, Carbon Fibers, Organic Fibers, Ceramic Fibers, Whiskers, Other Non-oxide Reinforcements, Comparison of Fibers

Matrix Materials: Polymers, Metals and Ceramic Matrix Materials.

8 Hours

UNIT -2

Micro mechanics of Composites: Introduction, Density, Evaluation of mechanical properties and prediction of elastic constants by using Rule of mixture, Numerical problems.



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Macro mechanics of Composites: Introduction, Hooke's law for different types of materials, Number of elastic constants, two dimensional relationship of compliance and stiffness matrix

08 Hours

UNIT -3

Macro Mechanics of a FRP Lamina: Hooke's law for two-dimensional angle lamina, engineering constants - Numerical problems. Stress-Strain relations of lamina for any arbitrary orientation, Numerical problems.

08 Hours

UNIT -4

Macro Mechanical Analysis of Laminate: Introduction, Kirchoff hypothesis, constitutive matrix in terms of coupling between extension- shear-bending and twisting of Composite laminates (Detailed derivation), special cases of laminates.

08 Hours

UNIT -5

Composites strength Theories: Maximum stress theory, Maximum strain theory, Tsai-Hill theory, Tsai, Wu tensor theory.

07 Hours

Textbooks:

1. Mechanics of Composite Materials, Robert M Jones, 2 nd Edition, CRC Press, 1998.
2. Fiber Reinforced Composites, Materials, Manufacturing, and Design, P. K. Mallick, 3 rd Edition, CRC Press, 2007.

Reference Books:

1. Mechanics of composite materials, Autar K. Kaw, 2 nd Edition, 2005, CRC Press New York.
2. Composite Science and Engineering, K. K. Chawla, 3rd Edition, Springer Verlag 2012.
3. Composite materials hand book, Mel M Schwartz, 2 nd Edition, McGraw Hill Book Company, 1991
4. Principles of composite Material mechanics, Ronald F. Gibron. 3 rd Edition, McGraw Hill international, 2011.
5. Mechanics of Composite Materials and Structures, Madhujit Mukhopadhyay, University Press 2005.

E-Books:

1. <http://www.ae.iitkgp.ac.in/ebooks/>
2. <http://nptel.ac.in/course.html>



B. M. S. COLLEGE OF ENGINEERING, BENGALURU
DEPARTMENT OF CIVIL ENGINEERING

Course Name	Global Warming & Climate change	Course Code	20CV6OEGWC	SEE Duration	03 Hours
Credits	03	L-T-P	3:0:0	Theory	50 M
Contact hours	36 hours	Lab Contact Hours	-	SEE+ CIE Marks	50+50 M

OBJECTIVES

To know the basics, and importance of global warming, the concept of mitigation measures against global warming, and the concept of mitigation measures against global warming

COURSE OUTCOMES: An ability to:

CO1: Describe causes and effects of greenhouse gases

CO2: Explain causes and impact of climate change and global measures taken

CO3: Suggest mitigation techniques for climate change.

UNIT-1

EARTH'S CLIMATE SYSTEM: Role of ozone in environment-ozone layer-ozone depleting gases-Green House Effect, Radiative Effects of Greenhouse Gases-The Hydrological Cycle-Green House Gases and Global Warming – Carbon Cycle.

7 hours

UNIT-2

ATMOSPHERE AND ITS COMPONENTS: Importance of Atmosphere-Physical Chemical Characteristics of Atmosphere- Vertical structure of the atmosphere-Composition of the atmosphere-Atmospheric stability-Temperature profile of the atmosphere-Lapse rates-Temperature inversion-effects of inversion on pollution dispersion.

7 hours

UNIT-3

IMPACTS OF CLIMATE CHANGE: Causes of Climate change: Change of Temperature in the environment-Melting of ice Pole-sea level rise-Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change –Risk of Irreversible Changes.

7 hours

UNIT-4

OBSERVED CHANGES AND ITS CAUSES: Climate change, Carbon foot print and Carbon credits- CDM- Initiatives in India-Kyoto Protocol- Intergovernmental Panel on Climate change-



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Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India.

7 hours

UNIT-5

CLIMATE CHANGE AND MITIGATION MEASURES: Clean Development Mechanism – Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco-Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power –Mitigation Efforts in India and Adaptation funding. Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry - Carbon sequestration – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation.

8 hours

TEXT BOOK

1. Dash Sushil Kumar, “*Climate Change – An Indian Perspective*”, Cambridge University Press India Pvt. Ltd, 2007.

REFERENCES

2. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press, Cambridge, 2006.
3. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
4. Jan C. van Dam, Impacts of “*Climate Change and Climate Variability on Hydrological Regimes*”, Cambridge University Press, 2003.

SEE paper pattern: Student shall answer FIVE full questions, selecting one from each unit.

UNIT 1 & UNIT 5 HAVE INTERNAL CHOICE.

CO-PO MAPPING SCALE 1 TO 3

COURSE : Global warming and climate change											CODE: 20CV6OEGWC				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	3	1	1	1	1	1	-	-	1
CO2	3	-	-	-	-	3	3	1	1	1	1	1	-	-	1
CO3	3	-	-	-	-	3	3	1	1	1	1	1	-	-	1

COURSE : Global warming and climate change				CODE: 20CV6OEGWC						
Taxonomy levels and COs	Remember/ understand	Apply	Analyze	Design	Create or any other					
CO1	✓	✓								
CO2	✓	✓								
CO3	✓	✓								

Dept. of Aerospace Engineering

FATIGUE AND FRACTURE MECHANICS (6th Semester Open Elective)

Course Title: FATIGUE AND FRACTURE MECHANICS

Course code: 20AE6IE FFM

Course Pre-requisites:

Basic course on Strength of Materials

Unit-1

Introduction - Introduction to Fatigue, Definition, Historical overview of fatigue, Phases in fatigue life - crack initiation, crack growth, final fracture (Micro/macro aspects of fatigue of metals).

Fatigue of Structures I - Stress Life (S-N) approach – Introduction, S-N Curves, Endurance limit, Effect of Mean stress and Haigh diagrams, Life estimation with the S-N Approach Design of Components - Goodman, Gerber and Soderberg relations and diagrams. Notches, Stress concentration factors, Notched S-N curves.

Unit-2

Fatigue of Structures II - Strain Life (ϵ -N) approach – Introduction, Material behaviour - monotonic stress-strain behaviour, cyclic stress strain behaviour, transient behaviour (cyclic strain hardening and softening), cyclic stress-strain curve determination, Stress-plastic strain power law relation, Strain life curve (Coffin-Manson relation), Neuber's rule.

Unit-3

Statistical Aspects of Fatigue Behaviour - Low cycle and high cycle fatigue, Transition life, Cycle counting techniques, Definition of fatigue damage, Cumulative damage, Miner's theory, other theories.

Unit-4

Fracture Mechanics – Introduction, Strength of cracked bodies, Linear Elastic Fracture Mechanics (LEFM), Griffith's theory, Irwin extension of Griffith's theory to ductile materials, Stress intensity factor, Stress analysis of cracked bodies, Relation between G & K, Crack tip plasticity, Effect of crack tip plasticity on G, Fracture toughness, Effect of thickness on fracture toughness, Stress intensity factors for typical geometries. Fatigue crack growth curve, Empirical relation describing crack growth law-life calculations.

Unit-5

Fatigue Design and Testing - Evolution of design philosophies - Safe life, Fail-safe, Damage tolerance, Introduction to Fatigue & Damage Tolerance evaluation, recommended practices to improve fatigue design.

Text Books:

1. Elementary Engineering Fracture Mechanics, D. Broek, Noordhoff International Publishing Co., London, 1994.
2. Metal fatigue in Engineering, Ralph I Stephens, Ali Fatemi, Robert, A Wiely - Interscience, 2nd Edition, 2001.
3. Fundamentals of Fracture Mechanics, J. F. Knott, Butterworth & Co., (Publishers) Ltd., London, 1983.

Reference Books:

1. Fatigue of Aircraft Structures, W. Barrois and L. Ripley, Pergamon Press, Oxford, 1983.
2. Mechanics of Fracture, C. G. Sih, Vol.1, Sijhoff and Noordhoff International Publishing Co., Netherland, 1989
3. Fatigue of structures & materials, Jaap Schijve, Kluwer Academic Publishers, 2004
4. Deformation and Fracture Mechanics of Engineering Materials, Richard W. Hertzberg, John Wiley & Sons, 1996 4th Edition
5. Fracture Mechanics – Fundamentals & Applications, T. L. Anderson, Taylor & Francis Group, 3rd Edition 2005
6. Fundamentals of Metal Fatigue Analysis, Julie A Bannantine, Jess J Comer & James, Prentice-Hall, Inc, New Jersey, 1990

Course outcomes: After completion of the course students will be able to

CO1: Analyse fatigue of structures & its characteristics under external load.

CO2: Solve fatigue life of structures undergoing plastic behavior under external load at variable amplitude loading.

CO3: Describe the mechanics of fracture to study crack growth in materials Predict the fatigue crack growth of a component using fracture mechanics.

CO4: Identifying modern design philosophy.

DEPARTMENT OF MECHANICAL ENGINEERING, BMSCE

Course		Credits : 03			Marks	
Name	Python Programming	L	T	P	CIE	SEE
Code	20ME6OEPYP	3	0	0	50	50

PRE-REQUISITES:

Basic Programming Skills, Statistics, Mathematics

Course Objectives:

1. Acquire problem solving skills
2. Write programs using Python programming language

SYLLABUS:

UNIT – 1

Introduction to python: Course Overview, Python Development Environments, Simple and compound expressions, Keywords, identifiers, Statements, comments, Assignments, Variables, Datatypes-Numbers, List, Tuple, String, Set, Dictionary, Type conversion, I/O and import, operators, namespace, Handling Errors in python

6 Hours

UNIT – 2

Logical and conditionals: Logical expressions, Comparisons, Conditional execution, loops(For, While, If-Else, Switchcase, Pass statements).

3 Hours

Files: File Operations, Open a file, Creating a File, Reading From a File, File offsets, Renaming and deleting, File object methods, Iterating through Files,

3 Hours

UNIT – 3

Python Modules, packages, string and Regular Expressions: Using modules, package and its use, Characters and strings, String methods, Strings in action, Regular Expressions(RegEx) Simple programs.

6 Hours

UNIT – 4

Functions: Function definition, Calling and defining functions, local and global variables, name resolution, return statement, functions as objects, function attributes, examples

5 Hours

Object oriented programming: Python Classes and objects, Creation of classes, Class Methods, the `_init_()` method, Inheritance, Encapsulation, Polymorphism.

4 Hours

UNIT – 5

Python requirements for Machine Learning:

Introduction, Scipy, pandas, Numpy, Dataframes, Matplotlib, sklearn, Seaborn packages

9 Hours

TEXT BOOK:

1. Python Crash Course: A Hands-On, Project-Based Introduction to Programming
by Eric Matthes, 2nd Edition.

2. Learn Python the Hardway by Zeo A Shaw, 3rd Edition.

REFERENCE BOOKS:

1. **Introducing Python** by Bill Lubanovic, O'Reilly Media, 2014.
2. **Python Essential Reference**, 4th Edition by David M. Beazley, Pearson Education, 2009
3. **Learning with Python: How to Think Like a Computer Scientist**, Allen Downey, Jeffrey Elkner and Chris Meyers, Dreamtech Press, 2015.
4. **Learning to Program using Python** by Cody Jackson, Second Edition, 2014.
5. **Programming Python**, Mark Lutz, O'reilly Media, 2015

E-BOOKS:

<http://www.onlineprogrammingbooks.com/learning-program-using-python/>

<http://www.greenteapress.com/thinkpython/thinkpython.pdf>

MOOCs:

1. <https://www.coursera.org/learn/python-basics>
2. <https://www.edx.org/course/introduction-computer-science-mitx-6-00-1x-8>
3. <https://www.class-central.com/mooc/4174/coursera-python-data-structures>

COURSE OUTCOMES

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

CO 1	Apply the Python environment, basic operations, objects, files, exceptions
CO 2	Provide an analysis for usage of file operations, exception hierarchy
CO 3	Implement control structures using appropriate techniques and resources.
CO 4	Justify the importance of database management and system tools.
CO 5	Develop Object oriented programming concepts
CO 6	Use operations and constructs of programming to implement solutions for engineering problems

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.

DEPARTMENT OF MECHANICAL ENGINEERING, B.M.S.C.E

Course	Digital Marketing	Course Code	L-T-P	Total No of Lecture Hours
Credits	3	20ME6OEDGM	3-0-0	39

UNIT I

Marketing: Introduction, basics of marketing, marketing process, understanding the market place and customer needs, designing a customer value, value proposition, marketing mix, segmentation, targeting and positioning

Digital Marketing: Introduction, Internet- Evolution, Key terms and concepts. Understanding marketing strategy, crafting a digital marketing strategy. Case studies 7 Hours

UNIT II

User Experience Design: Introduction, Key terms and concepts, Understanding UX design, Core principles of UX design, Mobile UX, Step-by-step guide to UX design.

Web Development and Design: Introduction, Key terms and concepts. Web design, Web development.

Mobile development. Step-by-step guide to building a website.

Search Engine Optimisation (SEO) Introduction, Understanding SEO. Search engine friendly website structure. SEO and key phrases. Link popularity. User insights. Benefits and challenges.

Customer Relationship Management: Introduction, Key terms and concepts, A CRM model.

Understanding customers. CRM and data. The benefits of CRM. Social CRM. Step-by-step guide to implementing a CRM strategy. Case studies 10 Hours

UNIT III

Content Marketing: Introduction, Key terms and concepts, meaning, Strategic building blocks. Content creation. Advantages and challenges.

Search Advertising: Introduction, Key terms and concepts. Advertising in search. The elements of a search ad. Targeting options. Bidding and ranking for search ads. Tracking. Advantages and challenges.

Online Advertising: Introduction, Key terms and concepts. Types of display adverts. Payment models for display Advertising. Getting your ads online. Targeting and optimising. Step-by-step guide to online advertising.

Advertising. Advantages and challenges.

Affiliate Marketing: Introduction, Key terms and concepts. The building blocks of affiliate marketing. Setting up a campaign. Advantages and challenges.

Video Marketing: Introduction, Key terms and concepts, Video content strategy, Video production step by step, video promotion. Advantages and challenges.

Email Marketing: Introduction: Key terms and concepts. Email strategy and planning. Step-by-step process. Advantages and challenges.

Mobile Marketing: Introduction, Key terms and concepts. The role of mobile in personal communication. Mobile messaging channels. Location and mobile. Mobile commerce. Integrating mobile into online marketing. Augmented reality. Mobile analytics. Advantages and challenges.

Case studies 12 Hours

UNIT IV

Social Media Channels: Introduction, Key terms and concepts, Traditional media vs Social media.

Social media channels: Social networking. Content creation, Tracking social media campaigns.

Social media marketing: Rules of engagement. Advantages and challenges.

Social Media Strategy: Introduction, Key terms and concepts. Using social media to solve business

challenges. Step-by-step guide to creating a social media strategy. Dealing with opportunities and threats.

Step-by-step guide for recovering from an online brand attack. Social media risks and challenges. Case studies

6 Hours

UNIT V

Data Analytics: Introduction, Key terms and concepts. Working with data. Setting objectives, goals and

KPIs. Tracking and collecting data. Analysing data. Advantages and challenges.

Conversion Optimisation: Introduction, Key terms and concepts. What can you test? Designing tests. Step-by-step guide to conversion optimisation.

4 Hours

RECOMMENDED BOOKS:

1. The Essential Guide to Online Marketing, Rob Stokes, Quirk, ISBN: 9781936126323
2. E-Marketing, Judy Strauss and Raymond Frost, Prentice Hall, 7th Edition, 2013
3. Internet Marketing: Integrating Online and Offline Strategies. M. L. Roberts and Debra Zahay, Cengage Publishing, 3rd edition, 2013
4. Principles of Marketing, Philip Kotler, Gary Armstrong, Mark Oliver, Pearson Publications, 17th Edition,

REFERENCE BOOKS:

1. Digital Marketing: Strategy, Implementation and Practice, Chaffey D., Ellis- Chadwick F., Pearson, 5th Edition, 2012.
2. The New Rules of Marketing and PR: How to Use Social Media, Blogs, News Releases, Online Video, and Viral Marketing to Reach Buyers Directly, David Meerman Scott, 2nd Edition, Jan 2010
3. E-Commerce: An Indian Perspective, P. T. Joseph, Prentice Hall, 4th Edition, 2013

MOOC:

“Digital Marketing, Social Media and E-Commerce for Your Business” at edX started on April 18, 2016

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

CO1 Apply knowledge of Digital marketing theories and practices to solve business problems

CO2 Foster Analytical and critical thinking abilities for data based decision making

CO3 Understand, analyse, communicate global, economic, legal, and ethical aspects of E-marketing

CO4 Create a website with provided parameters

CIE -1,2,3 = 40 Marks & AAT = 10 Marks.

The method of AAT for a group of students is as mentioned below:

1. Review paper or 2. Research Paper

Marks will be awarded based on the following:

1. Literature Survey & Documentation
2. Research
3. Presentation

Scheme of examination: To set one question from Unit 1, Unit 4 and Unit 5 and set two questions from Unit 2 and Unit 3.



DEPARTMENT OF MECHANICAL ENGINEERING

Course		Credits: 03			Marks	
Name	Material Characterization	L	T	P	CIE	SEE
Code	20ME6OEMAC	3	0	0	50	50

PRE-REQUISITES: Applied Physics and Engineering Chemistry
or
Material Science and Metallurgy

SYLLABUS:

UNIT – 1

X-ray Diffraction: Importance of material characterization, Introduction to X-ray, Basics of Crystallography, X-ray generation, properties, absorption and filtering, Basic diffraction theory, Bragg's Law, Powder Method, Determination of Crystal structure – Simple indexing problems **09 Hours**

UNIT – 2

Electron Microscopy: General principles, Electron – specimen interaction, Electron optics, TEM - Image formation scheme, Reciprocal lattice, Electron diffraction, Specimen preparation, SEM - Signal generation, Modes of operation, Specimen preparation, EDAX **08 Hours**

UNIT – 3

Thermal Analysis: Thermogravimetry, Differential thermal analysis, Differential scanning calorimetry, Glass transition temperature, Dynamic mechanical thermal analysis, Viscoelasticity and its significance **08 Hours**

UNIT – 4

Spectro Analytical Methods: Beers law, Selection rules, IR spectroscopy, Quantitative analysis, Simple analytical problems, UV-visible spectroscopy, Atomic absorption spectrometry **09 Hours**

UNIT – 5

Surface Characterization: X-ray photoelectron spectroscopy, Scanning tunnelling microscopy, Atomic force microscopy, Comparison between electron microscopy and scanning probe microscopy **06 Hours**

TEXT BOOKS:

1. B. D. Cullity, Elements of X-ray Diffraction, Addison-Wisley Publishing Company, Inc, 2014.
2. K. Ramakanth Hebbal, Basics of X-ray Diffraction and its applications, I K International Publishing House Pvt. Ltd., 2007.
3. J. W. Robinson, E. M. S. Frame, and G. M Frame II, Undergraduate Instrumental Analysis, CRC Press, 2014.

REFERENCE BOOKS:

1. ASM Handbook, Vol. 9, Metallography and Microstructures, ASM International, 2004.
2. R. E. Smallman and K. M. B. Ashbee, Modern Metallography, Pergamon Press, 2013.
3. D. A. Skoog, F. J. Holler and S. R. Crouch, Principles of Instrumental Analysis, Cengage Learning, 2017.
4. J. D. Menczel, R. B. Prime, Thermal Analysis of Polymers, Wiley, 2009.

MOOCs:

1. <https://nptel.ac.in/courses/113/106/113106034/>
2. <https://nptel.ac.in/courses/113/106/113106064/>
3. <https://nptel.ac.in/courses/113/104/113104004/>

COURSE OUTCOMES:

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

CO 1	Appreciate the importance of XRD, and analyze different specimens of XRD both qualitatively and quantitatively
CO 2	Acquire knowledge on the basic principles of electron microscopes and their specimen preparation techniques.
CO 3	Identify and use the proper thermal analysis technique for a given requirement
CO 4	Understand the principles and interpretation methods of major spectroscopies
CO 5	Select appropriate characterization tool for surface analysis and interpret surface characteristics
CO 6	Comprehend the results and discussion of material characterization techniques

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.

Course Title	PLC AND SCADA (Open Elective I) (Except EIE)			
Course Code	19EE6OE1PS	Credits	03	L-T-P

Prerequisites: None

Course Description: This course develops the functional design, hardware configuration, programming and application of Programmable Logic Controllers (PLC). The design and programming of control circuits using examples from industrial applications will be emphasized. The application of PLC's in process automation will be examined. An overview of functional hardware design will be included. The equipment used will be small and medium sized PLC's with both digital and analog capabilities.

Course Outcome

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

CO1: Gain knowledge about the working of Data Loggers, DDC, SCADA, DCS, PLC and its uses in solving engineering problems.

CO2: Apply the concepts of automation for various processes.

CO3: Analyze and formulate the requirements of appropriate ladder programs to provide solutions using PLCs.

CO4: To design and apply program control, arithmetic, relay, data handling, sequencer, timer and counter instructions in development of solutions

UNIT-I		7 hours
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Computers In Process Control

Data loggers – Data Acquisition Systems (DAS) –Computer controlled system configurations – direct control, supervisory computer control, Introduction to SCADA- Evolution, Objectives SCADA Architecture- IEC61850 standard, Elements, Functions, Applications and Benefits of SCADA systems.

UNIT-II		8 hours
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Programmable Logic Controller (PLC) Basics

Introduction and importance of PLC, Types of PLC, Basic architecture of CPU of PLC, Basic wiring diagram of PLC, PLC operation and various standards, input/output modules- power supplies and isolators. General PLC programming procedures-programming on-off inputs/outputs.

UNIT-III		8 hours
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Programming of PLC Using Timers and Counters

Introduction to programming standards of PLC, basic relay instruction, timer and counter instructions, Related programming and practice examples.

UNIT-IV		8 hours
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Advanced Instructions in PLC

PLC intermediate functions: Arithmetic functions - comparison functions, logic functions – Data handling instructions. PLC sequencer instructions, PLC program flow instructions, Designing of I/O system, creating ladder diagram from process control description.

UNIT-V	8hours
Distributed control systems (DCS) Definition – merits and demerits, Local Control Unit (LCU) architecture – hierarchical system structure functional level, database organization, field stations, intermediate stations, central computer station, monitoring and command facilities.	
Text books:	
1. John.W. Webb, Ronald A Reis, “Programmable Logic Controllers - Principles and Applications”, Prentice Hall Inc., New Jersey, 2003. 2. Frank D. Petruzzella, “Programmable Logic Controllers”, McGraw Hill, New York, 2004. 3. M.Chidambaram, “Computer Control of Process,” Narosa Publishing, New Delhi, 2003 4. Gary Dunning “introduction to Programmable logic controllers” 3 edition, CENGAGE learning	
Reference books:	
1. B.G. Liptak, “Process software and digital networks,” CRC press, Florida-2003. 2. Curtis D. Johnson “Process control instrumentation technology,” Prentice Hall, New Jersey 2006. 3. Krishna Kant, “Computer-Based Industrial Control,” PHI, New Delhi, 2004	
E-Learning :	
1.	http://www.nptel.ac.in/courses/108106022/8
2.	http://nptel.ac.in/courses/108105062/



BMS College of Engineering, Bangalore – 19
(Autonomous College under VTU)

Course Title	ELECTRONIC ENGINEERING MATERIALS				
Course Code	19EC6OE1EM	Credits	3	L-T-P	3:0:0
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 to

CO-1	Apply concepts of physics and chemistry to identify the application of materials in various engineering domains
CO-2	Analyze the various material preparation and characterization techniques available and hence infer on the selection of a method to suit requirements
CO-3	Conduct survey on recent application of materials and write a report/survey paper while following professional ethics

UNIT 1 **07**
hours

Introduction : Classification of engineering materials, levels of structure, structure-property relationships in materials, units, constants and conversion factors, basic thermodynamic functions, statistical nature of entropy, kinetics of thermally activated processes, Novel materials for sensing applications

UNIT 2 **09**
hours

Electrical properties of materials : Electrical conduction, conductivity, conduction in terms of band and atomic bonding models, electron mobility, electrical resistivity of metals, electrical characteristics of commercial alloys, semi conductivity, temp dependence of carrier concentration, factors that affect carrier mobility, Hall effect, dielectric behaviour, types of polarization, frequency dependence of the dielectric constant, Ferro electricity, piezoelectricity

UNIT 3 **07**
hours

Optical properties: Basic concepts, Absorption process, Tauc relation to calculate band gap of materials, Refractive index. Applications of optical properties: photoconductivity, fluorescence and luminescence

UNIT 4 **07**
hours

Fabrication methods: Thermal Evaporation, e-beam evaporation, sputtering spin coating CVD techniques

Unit 5: **6 hours**

Characterization of materials: XRD, SEM, AFM, TEM, Van der Paul method of resistance measurement

Text books:

1. Elementary Solid State Physics: Principles and Applications- Omar Ali – 6th Edition (PEARSON)
2. Material Science and Engineering- A First Course – V. Raghavan -6th edition (PHI)
3. Material Science and Engineering - William D. Callister – 2nd edition (Wiley)

REFERENCE BOOKS:

1. Materials Science of thin films – Milton Ohring- 2nd edition (Academic Press)

E Books:

1. <https://pdfs.semanticscholar.org/fac1/91c1fa2e11ff2dd5367c02b88e65fda25011.pdf>
2. https://shodhganga.inflibnet.ac.in/bitstream/10603/60701/8/08_chapter%202.pdf

NPTEL/MOOCs:

1. <https://nptel.ac.in/courses/113/102/113102080/>
2. <https://nptel.ac.in/courses/112/105/112105053/>



B.M.S. COLLEGE OF ENGINEERING (Autonomous), BENGALURU-19
DEPARTMENT OF INDUSTRIAL ENGINEERING & MANAGEMENT

INSTITUTION ELECTIVE-1

Course	OPERATIONS RESEARCH	Course Code	20IM6IEOPR
Credits	03	L-T-P	3-0-0

Prerequisites: NIL

UNIT-1

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. **11 Hrs**

UNIT-2

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. **06 Hrs**

UNIT-3

ASSIGNMENT PROBLEM- Formulation, types, Hungarian method for assignment problem, Unbalanced assignment problem, application to maximization cases and travelling salesmen problem **06 Hrs**

UNIT-4

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 projects. **11 Hrs**

UNIT-5

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. **06 Hrs**



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TEXT BOOK:

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

REFERENCE BOOKS:

1. Hiller and Liberman -Introduction to Operations Research, Ninth edition McGraw Hill Publications.
2. Hamdy ATaha 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> D S Hira-2008
3. <https://books.google.co.in/books?isbn=8131700003>, A. M. Natarajan, PBalasubramani-2006

Question Paper Pattern:

1. Each unit consists of one full question.
2. Each full question consists of two, three or four subdivisions.
3. Five full questions to be answered.
4. Internal choice in Unit 1 and Unit 4.

COURSE OUTCOMES

CO#	Course Outcomes	POs	Strength
CO1	Ability to understand the concepts, approaches and optimization in Operation Research Techniques.	-	1
CO2	Ability to apply and develop the mathematical skills related to Operation Research Techniques.	PO2	3
CO3	Ability to analyze and solve network models arising from a wide range of applications	PO3	3
CO4	Ability to evaluate real world problems using Operation Research Techniques.	PO4	2

ASSESSMENT

Continuous Internal Evaluation (CIE) includes periodic class tests, quizzes or Alternative Assessment Tools (AAT) prescribed by the faculty handling a course prior to beginning of the classes like assignments, problem solving, case studies, group discussion, seminar, mini-project etc.

Semester End Examination (SEE)-a written examination for theory course



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Both CIE and SEE have equal (50:50) weightages. The student's performance in a course shall be judged individually and together based on the results of CIE and SEE.



B.M.S. COLLEGE OF ENGINEERING (Autonomous), BENGALURU-19
DEPARTMENT OF INDUSTRIAL ENGINEERING & MANAGEMENT

Course	MANAGEMENT AND ENTREPRENEURSHIP	Course Code	20IM6IEMAE
Credits	03	L-T-P	3-0-0

Prerequisites: Nil

UNIT- 1

MANAGEMENT : Introduction- Historical evolution of management, Thought and its Development, Scope and Functional areas of management, Management as a science, art of profession Management and Administration Roles of Management, Levels of Management, functions of Management **06 Hrs**

UNIT- 2

PLANNING AND ORGANIZING: Nature, importance and purpose of planning process Objectives Types of plans Importance of planning steps in planning and planning premises Hierarchy of plans.

Introduction of organization-Principles of organization Types of organization, centralization Vs decentralization of authority and responsibility Span of control, MBO and MBE. **06 Hrs**

UNIT- 3

STAFFING, DIRECTING & CONTROLLING: Purpose and importance of staffing-selection process and recruitment, appraisal, Meaning and purpose of Directing Leadership styles, motivation theories, communication and Coordination. Techniques of Co-ordination, Meaning and steps in controlling- essentials of a sound control system-methods of establishing control **06 Hrs**

UNIT- 4

ENTREPRENEURSHIP: Meaning of Entrepreneur, evolution of the concept, functions of an entrepreneur, types of an entrepreneur, Concept of Entrepreneurship, stages in entrepreneurial process; role of entrepreneurs in economic development, Entrepreneurship in India, barriers for entrepreneurship.

SMALL SCALE INDUSTRIES : Definition, characteristics; scope and role of SSI in economic development, advantages of SSI, steps to start and SSI changes in government policy towards SSI in the past 4 decades, Impact of Liberalization, Privatization, Globalization on SSI, Effect of WTO/GATT on SSI, Ancillary industry and tiny industry **11 Hrs**

UNIT- 5

INSTITUTIONAL SUPPORT : Government agencies supporting industrial activities, schemes; TECKSOK, KIADB, KSSIDC, KSIMC,DIC Single window agency, SISI; NSIC, SIDBI, KSFC.-Industrial Finance

PREPARATION OF PROJECT: Meaning of project; Project identification; Project selection; project report; need and significance of report; Contents: Network analysis; Errors of Project report: project appraisal, identification of business opportunities; Market Feasibility study technical feasibility study, financial feasibility study and social feasibility study. **11 Hrs**



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TEXT BOOKS:

1. **Management and Entrepreneurship**- NVR Naidu& T. Krishna Rao, I K Publishing, 2008 ISBN 978-81-906757-8-9
2. **Dynamics of Entrepreneurial Development & Management**-Vasant Desai, Himalaya Publishing House.Himalaya Publishing House, 2009,ISBN8178669870, 9788178669878
3. **Entrepreneurship Development** -Poornima M. Charantimath, Small Business Enterprises Pearson Education 2006, ISBN-978-81-7758-260-4(For Unit-2 & 4).

REFERENCE BOOKS:

1. **Essentials of Management** Harold Koontz, Heinz Weihrich, Ramachandra Aryasri, Tata McGraw Hill, 2010.
2. **Principles of Management**, P.C.Tripathi,P.N.Reddy Tata McGraw Hill. 2004 ISBN1259050572, 9781259050572
3. **Management Fundamentals Concepts, Application, Skill Development**- Roberts LusierThomson/South-Western, 2003, ISBN 032411754X, 9780324117547
4. **Entrepreneurship Development**- S. S. Khanka S. Chand & Co.,1999, ISBN-81-219-1801-4
5. **Management** Stephen Robbins Pearson Education/PHI 17th Edition, 2003.

ONLINE REFERENCE: <http://nptel.ac.in/courses.php>

MOOCS:<https://www.class-central.com/subject/>

COURSE OUTCOMES:

CO#	Course Outcomes	POs	Strength
CO1	Ability to understand the basic principles and concepts of management and Entrepreneurship	-	1
CO2	Ability to apply the principles of management and entrepreneurship.	PO1	1
CO3	Ability to analyze Management issues to solve the problem to facilitate decision making.	PO2	3
CO4	Ability to formulate and evaluate the feasibility of the project report	PO3	3

SCHEME OF EXAMINATION: One question from units 1, 2 & 3 and two questions from units 4& 5.

ASSESSMENT:

Continuous Internal Evaluation (CIE) includes mid-term tests, weekly/fortnightly class test, homework assignments, problem solving, group discussions quiz, seminar, mini-project and other Alternate Assessment Tools (AAT)prescribed by the faculty handling a course prior to beginning of the classes.

Semester End Examination(SEE)-a written examination for theory course Both CIE and SEE have equal (50:50) weightages. The student's performance in a course shall be judged individually and together based on the results of CIE and SEE



B.M.S. COLLEGE OF ENGINEERING (Autonomous), BENGALURU-19
DEPARTMENT OF INDUSTRIAL ENGINEERING & MANAGEMENT

Course	SUPPLY CHAIN AND LOGISTICS MANAGEMENT	Course Code	20IM6IESCM
Credits	03	L-T-P	3-0-0

Prerequisites: Nil

UNIT-1

INTRODUCTION TO SUPPLY CHAIN: Understanding Supply Chain - Objectives-importance Decision phases – Process view of a supply chain – Examples of supply chains – Supply chain performance - An overview: Competitive and supply chain strategies- Achieving strategic fit- Expanding strategic scope. Drivers of Supply Chain Performance: Framework for structuring drivers: Facilities, Inventory, Transportation, Information, Sourcing, Pricing, obstacles to achieving fit. **06 Hrs**

UNIT-2

DESIGNING THE SUPPLY CHAIN NETWORK: The Role of Distribution in the Supply Chains, Factors influencing distribution Network design, Design Options for a Distribution Network, e-Business and the Distribution network, Distribution Networks in practice. Factors influencing network design decisions, Framework for Network design decisions, Models for Facility location and Capacity allocation, The role of IT in Network design. The impact of uncertainty on network design, Discounted cash flow analysis, Representations of Uncertainty, Evaluating Network Design Decisions Using Decisions Trees, Risk Management and Network Design. Problems to be discussed. **06 Hrs**

UNIT-3

INVENTORY MANAGEMENT IN SUPPLY CHAIN: Definition of Inventory, inventory classification: P-System, Q-System, ABC system, VED, FSND and XYZ analysis. Classification of Inventory Models, Derivation and problems considering EOQ model for a single product with and without shortage. Economies of Scale to Exploit Quantity Discounts, Short-Term Discounting, Trade Promotions. The Role of Safety Inventory in a Supply Chain, Determining appropriate level of Safety inventory, Impact of supply Uncertainty on Safety inventory, Impact of aggregation on safety inventory, impact of replenishment policies on safety inventory. The Role of IT in inventory management. Problems to be discussed. **11 Hrs**



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UNIT-4

DESIGNING AND PLANNING TRANSPORTATION NETWORKS: The role of transportation in a Supply chain, Modes of transportation and their performance characteristics, Transportation infrastructure and policies, Design options for a transportation network, Trade-offs in transportation design, Tailored transportation, The role of IT in transportation. Problems to be discussed.

Managing Cross-Functional Drivers In A Supply Chain: The role of sourcing in a supply chain, in-house or outsource, Third-and Fourth-party logistics providers, Supplier scoring and assessment, Supplier selection-Auctions and Negotiations, Contracts and supply chain performance, Design Collaboration, The procurement process, sourcing planning and analysis, the role of IT in sourcing. **11 Hrs**

UNIT-5

CURRENT TRENDS IN SUPPLY CHAIN & LOGISTIC MANAGEMENT: Over view on e-SRM, e-LRM, e-SCM and block chain in SCM. Introduction to Supply Analytics: Descriptive Analytics, Prescriptive Analytics and Predictive Analytics. The role of sustainability in a Supply Chain, Key Metrics for sustainability and its drivers. Introduction to Reverse logistics, Closed Loop Supply Chains, Lean and Agile supply chains. **06 Hrs**

TEXT BOOKS:

1. **Supply Chain Management**, Chopra, S., Meindl, P. and Kalra, D.V., 7th Edition, Pearson, 2018.
2. **Designing And Managing the Supply Chain** David SimchiLevi , Edith Simchi Levi , Ravi Shankar and Philip Kaminsky, : Concepts, Strategies and Case studies, 3rd Edition, McGraw-Hill, 2019.
3. **Materials Management:** Procedures, Text and Cases, A K Datta, 2nd Edition, Prentice Hall India Learning Private Limited, 1998.
4. **Introduction to Materials Management** Chapman, Gatewood, Arnold and Clive, , 8th Edition, Pearson Education India, 2016.



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REFERENCE BOOKS:

1. **Supply Chain Logistics Management** Bowersox, McGraw Hill Education, 4th Edition, 2018.
2. **Supply Chain Management: A Logistics Perspective**, John J. Coyle, Jr. C. John Langley, Robert A. Novack and Brian J. Gibson, 10th Edition, 2019
3. **Principles of Supply Chain Management (Resource Management)** Richard E. Crandall, William R. Crandall, Charlie C. Chen, , 2nd Edition, 2014.
4. **Introduction to Materials Management**, Stephen N. Chapman, Tony K. Arnold, Ann K. Gatewood, Lloyd Clive, 8th Edition, Pearson, 2016

ONLINE RESOURCE: www.nptel.ac.in

COURSE OUTCOME

CO#	Course Outcomes	POs	Strength
CO1	Understand supply chain basics, Role of SCM as systemic and strategic nature in dealing with global competitive environment	-	1
CO2	Evaluate supply chain alternatives and distribution network structures applying Operation Research models.	PO1, PO6	3
CO3	Develop optimum sourcing and inventory policies in the supply chain context.	PO2	3
CO4	Select and incorporate latest practices for managing supply chain processes	PO4	2

SCHEME OF EXAMINATION: One Question to be set from **unit 1,2 & 5** and Two Questions from **unit 3 &4**.

ASSESSMENT:

Continuous Internal Evaluation (CIE) includes mid-term tests, weekly/fortnightly class test, homework assignments, problem solving, group discussions quiz, seminar, mini-project and other Alternate Assessment Tools (AAT) prescribed by the faculty handling a course prior to beginning of the classes.

Semester End Examination (SEE)-a written examination for theory course. Both CIE and SEE have equal (50:50) weights. The student's performance in a course shall be judged individually and together based on the results of CIE and SEE

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DEPARTMENT OF CSE

Academic Year	Aug-Dec 2020/Jan-May 2021	Sem	6th
Course Title:	Java Programming		
Course Code:	20CS6OEJVP		
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	Introduction of Java: How Java changed the Internet Java is interpreted, Java's Magic: Byte code, Java BuzzWords. Overview of Java, First Simple Program. Data types, Variables and Arrays: Java is strongly typed language, Integers, Floating Point Types, Characters, Booleans, Variables, Arrays - One Dimensional, Multidimensional Arrays, Alternative Array Declaration syntax Control Statements: Selection statements, iteration statements, Jump statements. Introducing Classes - class Fundamentals, Declaring Objects, Introducing Methods, Constructors, this keyword, Garbage Collection, finalize() method. Closer Look at Methods and Classes: Overloading Methods, Using Objects as parameters, A closer look at Argument passing, Returning Objects, Introducing Access Control, Understanding static, Introducing Final, Arrays Revisited, Inner classes.	8	Text Book 1 Chapter 1, Chapter 2, Chapter 3, Chapter 5, Chapter 6, Chapter 7.
2	Inheritance: Inheritance Basics, Using super, multilevel hierarchy, dynamic method dispatch, Using abstract class, Using final with inheritance. Packages: Defining a package, Finding packages and class path, Example, Access protection, importing packages. Interfaces: Defining Interface, Implementing Interface, Nested Interfaces, Applying interfaces, Variables in interfaces. Interfaces can be Extended.	8	Text Book 1 Chapter 8, Chapter 9,
3	Enumeration: Enumeration Fundamentals, value() and valueOf() Methods, Java Enum's are class types. I/O Basics: Streams: Byte Streams and Character Streams, Predefined Streams, Reading Console Input .Reading Characters, Reading Strings, Writing Console Output, Reading and Writing Files. String handling: String Constructors, Special string operations, character extraction, string comparison, searching strings, modifying a string, StringBuffer, additional StringBuffer methods.	7	Text Book 1 Chapter 12, Chapter 13, Chapter 17
4	Exception handling: Fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch	8	Text Book 1 Chapter 10

	clauses, nested try statements, throw, throws, finally, Java's built-in exceptions. Creating your own exception subclasses. Multithreaded Programming: Introduction to Process, Difference between Process and Threads, Java thread model, main thread, creating thread, creating multiple threads, using isalive() and Join(), thread priorities, synchronization, Interthread communication, suspending, resuming and stopping threads.		Chapter 11,
5	<p>Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, Events- Event Sources, Event Listeners, KeyEvent Class-The MouseEvent Class,Text Event class Event Listener Interfaces-The Mouse Listener Interface.</p> <p>Abstract window toolkit: Window Fundamentals,Working with Frame windows, Creating a Frame Window in an AWT-Based Applet-Handling Events in a Frame Window,Creating windowed Program.Introducing Graphics-Drawing Lines,Rectangles,Ellipses and Circles,Arcs.</p>	8	Text Book 1: Chapter 24, Chapter 25

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Java the Complete Reference.	Herbert Schildt	Eleventh Edition	Tata McGraw-hill Edition.	2019

Reference Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to JAVA Programming	Y. Daniel Liang	Ninth Edition	pearson education,	2012
2.	Programming in JAVA 5.0	James P Cohoon, Jack W Davidson	1 st Edition	Tata McGrawHil 1 Edition	2019
3.	Programming with Java A Primer	E.BalaGuru Swamy	Fifth Edition	McGraw Hill Education	2014

E-Book						
Sl. N O.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Java Object Oriented Problem Solving	R. Morelli and R. Walde	Third Edition	Pearson Education Inc	2012	https://ia800303.us.archive.org/26/items/JavaJavaObject-orientedProblemSolving/jjj-os.pdf

2.	The Art and Science of Java	Eric S. Roberts	Greg Tobin		2007	http://people.reed.edu/~jerry/121/materials/artsciencejava.pdf
3.	Java Programming	Wikibooks Contributors	Seventh Edition	wikibooks.org	2016	https://upload.wikimedia.org/wikipedia/commons/e/e7/Java_Programming.pdf
4.	Think Java How to Think Like a Computer Scientist	Allen B. Downey and Chris Mayfield	6.1.3	Green Tea Press Needham, Massachusetts	2016	https://www.pdfdrive.com/think-java-how-to-think-like-a-computer-scientist-e17327018.html
5	Introduction to Programming Using Java,	David J. Eck	Seventh Edition	Create Space	2014	http://math.hws.edu/javanotes/index.html .

MOOC Course				
Sl. No.	Course name	Course Offered By	Year	URL
1.	Object Oriented Programming in Java	Coursera	2019	https://www.classcentral.com/course/coursera-object-oriented-programming-in-java-4212
2.	Java Programming Basics	Udacity	2019	https://www.udacity.com/course/java-programming-basics--ud282
3.	Programming in Java	NPTEL	Aug – Oct 2019	https://onlinecourses.nptel.ac.in/noc18_cs41

B Course Outcomes

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

CO1	Apply knowledge of java constructs for developing programs/applications
CO2	Analyse the given java program to identify bugs and to write correct code.
CO3	Design java programs/ applications for a given requirement.
CO4	Conduct practical experiments for demonstrating features of java using eclipse.

C CO-PO-PSO mapping

D Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	40
QUIZ	ONE	5
Lab Component	---	-
Alternate Assessment Tool	ONE	5
Total		50

E Tutorial Plan (*if applicable*)

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F Laboratory Plan (*if applicable*)

G Alternate Assessment Tool Plan (*if applicable*)

Students are supposed to execute and demonstrate Java Program in the Lab based on the concepts taught in the theory class. The Programs will be set by course Instructor. From the List of programs student has to demonstrate any two of them as given by the course instructor.

H Alternative Assessment Evaluation Rubrics

Criteria	Excellent	Good	Unsatisfactory
Design and Implementation of Program (CO2,CO3,CO4,PO2, PO3,PO5)	Able To fully Design and Implement Program using appropriate Java Construct in accordance to the given problem (2)	Able To Moderately Design and Implement Program using appropriate Java Construct in accordance to the given problem (1.5)	Not Able to Design and Implement Program using appropriate Java Construct in accordance to the given Problem(0.5),
Demonstration (CO4,PO 3,5)	Demonstrates the functionality of the program with proper Input and Output using appropriate Tools of Java for all cases.(1)	Demonstrates the functionality of the program with proper Input and Output using appropriate Tools of Java for few cases.(0.5)	Demonstrates the functionality of the program without proper Input and Output using appropriate Tools of Java for few cases.(0)
Viva-Voce (CO1,PO1)	Able to Answer all Viva Questions of the java Concepts (1)	Able to Answer few Viva Questions of the java Concepts(0.5)	Able to Not Answer Viva Questions of the java Concepts(0)
Documentation (CO4,PO3,PO5)	Well written and neatly organized Report showing proper Input and Output(1).	Well written and neatly organized Report without showing proper Input and Output(0.5).	Not Well written and not neatly organized Report without Input and Output(0).

I SEE Exam Question paper format

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

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	25%
Apply / Analyze	40%
Create / Evaluate	35%



BMS COLLEGE OF ENGINEERING, BENGALURU-19.

Department of Computer Science and Engineering.

Autonomous Institute, Affiliated to VTU

PROPOSED NEW SYLLABUS

Academic Year	Apr-Jul 2022	Sem	6 th
Course Title:	Robotic Process Automation Design and Development		
Course Code:	21CC6OE1RD		
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	What is Robotic Process Automation? Scope and Techniques of automation: what should be automated? What can be automated? Techniques of automation Robotic Process Automation: What can RPA do? Benefits of RPA Components of RPA, RPA platforms. About UiPath. The future of automation. Record and Play: UiPath stack, Downloading and Installing UiPath Studio, Learning UiPath Studio, Task Recorder, Emptying trash in Gmail, Emptying Recycle Bin.	8	1 Chapter 1 & Chapter 2
	2	Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control flow, various types of loops, and decision making, how to use a sequence, how to use a flowchart, step by step example using sequence and control flow. Data Manipulation: Variables and scope, Collections, Arguments-purpose and use, Data table usage with examples, Clipboard management, File operation with step-by-step example. CSV/Excel to data table and vice versa examples.	8	1 Chapter 3 & Chapter 4
	3	Taking control of the controls : Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls-mouse and keyboard activities, working with UiExplorer, Handling events, Revisit recorder, Screen scraping, When to use OCR, Types of OCR available, How to use OCR, Avoiding typical failure points. Tame that Application with Plugins: Mail plugin, PDF plugin, web integration, Excel and Word plugins, Credential management.	8	1 Chapter 5 & Chapter 6
	4	Handling User Events and Assistant Bots: What are assistant bots? Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event.	8	1 Chapter 7 & Chapter 8



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		Exception Handling, Debugging, and Logging Exception handling: Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Error reporting.		
5		Managing and Maintaining the Code: Project Organization, Nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines or sequences, Using config files and examples of a config file. Deploying and Maintaining the Bot: Publishing using publish utility, Overview of Orchestration Server, Using Orchestration Server to control bots, Using Orchestration Server to deploy bots.	7	1 Chapter 9 & Chapter 10

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	“Learning Robotic Process Automation”	Alok Mani Tripathi	1st Edition	Packpub.com	2018

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
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E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Learning Robotic Process Automation	Alok Mani Tripathi	1st Edition	Packpub.com	2018	https://book.akij.net/eBooks/2018/November/5be2a5c7bc9bd/Sanet.st_Learning_Robotic_Proc.pdf

MOOC Course

Sl . N o.	Course name	Course Offered By	Year	URL
1.	RPA	UiPath	2016	https://www.uipath.com/developers/video-tutorials
2.	Robotic Process Automation	Guru99.com		https://www.guru99.com/uipath-tutorial.html



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B	Course Outcomes																																																																
	<i>At the end of the course the student will be able to</i>																																																																
CO1	Apply the concept of Robotic Process Automation to automate real-world applications.																																																																
CO2	Analyse the usage of appropriate Robotic Process Automation technique for a given application.																																																																
CO3	Design and implement techniques of Robotic Process Automation for the given application.																																																																
C	CO-PO-PSO mapping																																																																
	<table border="1"> <thead> <tr> <th></th><th>P O 1</th><th>P O 2</th><th>P O 3</th><th>P O 4</th><th>P O 5</th><th>P O 6</th><th>P O 7</th><th>P O 8</th><th>P O 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PS O1</th><th>PS O2</th><th>PS O3</th></tr> </thead> <tbody> <tr> <td>CO 1</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO 2</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO 3</td><td></td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td></tr> </tbody> </table>		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	CO 1	3															CO 2		3														CO 3			3											2	
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3																																																		
CO 1	3																																																																
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CO 3			3											2																																																			
	<i>Indicate strength of mapping (1/2/3) with justification</i>																																																																
D	Assessment Plan (for 50 marks of CIE)																																																																
	<table border="1"> <thead> <tr> <th>Tool</th><th>Remarks</th><th>Marks</th></tr> </thead> <tbody> <tr> <td>Internals</td><td>TWO</td><td>40</td></tr> <tr> <td>QUIZ</td><td>TWO</td><td>10</td></tr> <tr> <td>Lab Component</td><td>--</td><td>--</td></tr> <tr> <td>Alternate Assessment Tool</td><td>--</td><td>--</td></tr> <tr> <td>Total</td><td></td><td>50</td></tr> </tbody> </table>	Tool	Remarks	Marks	Internals	TWO	40	QUIZ	TWO	10	Lab Component	--	--	Alternate Assessment Tool	--	--	Total		50																																														
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F	Laboratory Plan (if applicable)																																																																

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H	SEE Exam Question paper format																																																																
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	Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each									
	Unit-4	Mandatory	One Question to be asked for 20 Marks									
	Unit-5	Mandatory	One Question to be asked for 20 Marks									
<table border="1"><thead><tr><th>Bloom's Level</th><th>Percentage of Questions to be Covered</th></tr></thead><tbody><tr><td>Remember / Understand</td><td>35%</td></tr><tr><td>Apply / Analyze</td><td>40%</td></tr><tr><td>Create / Evaluate</td><td>25%</td></tr></tbody></table>					Bloom's Level	Percentage of Questions to be Covered	Remember / Understand	35%	Apply / Analyze	40%	Create / Evaluate	25%
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B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19

(Autonomous Institute, Affiliated to VTU)

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	DATA STRUCTURES AND ALGORITHMS				
Course Code	20IS6OEDSA	Credits	3	L-T-P	3-0-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	3	Total Lecture Hours			

UNIT – 1	7 Hrs
Introduction to Data Structures: Definition and its classification, Dynamic Memory Allocation	
Linked List: Definition, Operations on Singly linked list, Doubly linked list, Circular linked list, Applications of Linked list.	
UNIT – 2	7 Hrs
Stacks: Definition, Stack Operations, Infix to Postfix, Evaluation of postfix	
Recursion: Factorial, Fibonacci, Tower of Hanoi	
Queues: Definition, Queue operations, Circular queue, Dequeue	
UNIT – 3	8 Hrs
Binary Search Trees: Definition, Traversals, Insertion, Deletion, Applications	
Fundamentals of Algorithm Analysis: Framework for Analysis of algorithm efficiency, Asymptotic Notations, Mathematical Analysis of Non recursive algorithms and Recursive algorithms.	
UNIT – 4	7 Hrs
Brute Force: Bubble Sort and Selection Sort	
Divide and Conquer: Merge sort, Quicksort	
Decrease and conquer: Depth First Search (DFS), Breadth First Search (BFS), Topological Sorting	
UNIT - 5	7 Hrs
Transform and Conquer: Heaps and Heap sort	
Space and Time Trade-offs: Hashing	
Dynamic Programming: Computing a Binomial Coefficient, Floyd's Algorithm, Knapsack Problem and Memory functions.	
Text Books :	
1. Data Structures using C and C++ by Yedidyah, Augenstein, Tannenbaum, 2nd Edition, Pearson Education, 2015	
2. Introduction to the design and analysis of algorithms by Anany Levitin, third Edition, Pearson Education, 2017	



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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Reference Books :

1. **Introduction to Algorithms**, Cormen T.H, Leiserson C. E, Rivest R.L, Stein C, 3rd Edition, PHI 2010.
2. **Data Structures and Algorithm Analysis in C++**, by Mark Allen Weiss, 3rd Edition, Pearson Education, 2007.

e-Books :

1. https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf
2. <https://www2.cs.duke.edu/courses/fall08/cps230/Book.pdf>

MOOCs

1. <https://www.coursera.org/specializations/data-structures-algorithms>
2. <https://www.coursera.org/learn/algorithms-part1>

COURSE OUTCOMES (COs)

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

CO1	Apply principles of Data Structures and Algorithm design techniques for solving problems.
CO2	Analyse and develop operations on linear and non-linear data structures.
CO3	Analyse the time complexity of different algorithms.
CO4	Design solutions to computing problems using appropriate data structures and algorithm design techniques.
CO5	Demonstrate data structure and algorithms coding skills on a competitive programming platform.

19ET6OE1PL: Introduction to Python and Latex

Course Title	Introduction to Python and Latex				
Course Code	19ET6OE1PL	Credits	3	L:T:P	3:0:0
UNIT I					[8 hours]
Introduction to Python: Introduction to python programming, Python code to plot of Signals/Functions; Use of Python as an extended calculator;					
UNIT II					[8 hours]
Python code to plot of Signals/Functions; perform operations on Signals and Functions; Addition, Multiplication, Integration, Differentiation					
UNIT III					[8 hours]
Python code for Probability Distribution functions (Discrete and Continuous); Generation of random sequence; Probability density function and Cumulative distribution function.					
UNIT IV					[8 hours]
Python code to plot of Frequency response, Pole-zero plot for a given transfer function; for given system transfer function ($H(s)$ and $H(z)$)					
UNIT V					[8 hours]
Introduction to Latex: Latex installation, Latex basics, tables, insertion of figures, mathematical symbols and equations; Document preparation using latex: Preparing document from scratch and template, Bibliography, Appendix, Writing Publications and thesis					

Course Outcomes:

CO1: Ability to develop the Python code to compute the desired parameter, through the given mathematical equation (PO1-3, PO5 - 3)

CO2: Ability to analyse the given Python code and compute the output (PO2-3, PO5 - 3)

CO3: Ability to develop the Latex code for documentation of the given content (PO5-3, PO10-3)

CO4: Ability to analyse the given Latex code and arrive at the document (PO2-3, PO5-3, PO10-3)

COURSE TITLE		MICROPROCESSORS			
COURSE CODE	19ET6OE1MP	CREDITS	3	L:T:P	3:0:0
UNIT I				[8 hours]	

8086 Processor

Historical background, 8086 CPU Architecture. Addressing modes, Machine language instruction formats.

Instruction Set of 8086:

Data transfer and arithmetic instructions., Illustration of these instructions with example programs

UNIT II

[8 hours]

Logical Instructions and Control/Branch Instructions

Logical Instructions, String manipulation instructions, Flag manipulation and Processor control instructions, Illustration of these instructions with example programs, control and branch instructions. Assembler Directives and Operators, Assembly Language Programming and example programs

UNIT III

[8 hours]

Stack and Interrupts

Introduction to stack, Stack structure of 8086, Programming for Stack. Interrupts and Interrupt Service routines, Interrupt cycle of 8086, NMI, INTR, Interrupt programming, Timing and Delays.

UNIT IV

[8 hours]

8086 Bus Configuration and Timings

Physical memory Organization, General Bus operation cycle, I/O addressing capability, Special processor activities, Minimum mode 8086 system and Timing diagrams, Maximum Mode 8086 system and Timing diagrams.

Basic Peripherals and their Interfacing with 8086 : Static RAM Interfacing with 8086 , Interfacing I/O ports, PIO 8255, Modes of operation – Mode-0 and BSR Mode, Interfacing simple switches and simple LEDs using 8255.

UNIT V

[8 hours]

Applications Interfacing ADC-0808/0809, DAC-0800, Stepper Motor using 8255 . Timer 8254 – Mode 0 & 3 and Interfacing programmes for these modes.

TEXT BOOK:

Advanced Microprocessors and Peripherals - A.K. Ray and K.M. Bhurchandi, TMH, 3rd Edition, 2012, ISBN 978-1-25-900613-5.

Course Title	COMPOSITE MATERIALS													
Course Code	1	9	C	H	6	O	E	C	O	M	Credits	03	L – T – P	3 – 0 – 0
CIE	100 marks (50% weightage)									SEE	100 marks (50% weightage)			

PREREQUISITES: Material Science and biomaterials, Nanomaterial & Technology & polymer technology

SYLLABUS:

UNIT -I

INTRODUCTION: Introduction to ceramics & advanced ceramics materials, superior structural, optical and electrical properties of ceramic composites, classification & application of advanced ceramics based on their functions.

CERAMIC FABRICATION METHODS: Gas phase reactions methods: direct metal oxidation & reaction bounding. Liquid precursor methods: Polymer pyrolysis. Fabrication from powders: melt casting and firing of compacted powders. All three methods for the preparation of ultra-fine powders of metal-oxides, metal-nitrides and metal-carbides.

07 Hrs

UNIT- II

SINTERING OF CERAMICS: Fundamental concepts in sintering, driving forces for sintering and Fick's Law of Diffusion in crystalline solids.

FORMING OF CERAMICS COMPOSITE MATERIALS: Hot pressing, iso-static pressing, slip casting, tape-casting and pressure casting, sol-gel processes for the formation of monolithic ceramics.

PROCESSING TECHNIQUES BASED ON REACTION METHODS: Chemical vapour deposition (CVD), plasma-enhanced chemical vapour deposition (PECVD), processing methods for synthesis of fibers (Boron, Aramid, Carbon and glass fibers) and whiskers.

10 Hrs

UNIT -III

SYNTHESIS OF MIXED CERAMIC OXIDES: Mechanical methods: Consolidation, mechano-chemical synthesis, Evaporation of liquid methods: Spray drying and Spray pyrolysis.

NON-CONVECTIONAL COMPOSITES: Polymer Clay Nanocomposites, Self-Healing Composites, Biocomposites, Laminates, Ceramic Laminates and Hybrid Composites.

06 Hrs

UNIT -IV

REINFORCEMENT: Mechanism of reinforcement, master bath & compounding equipment used for reinforcement. **REINFORCED METAL MATRIX:** Methods for preparation of powdered metal matrix, fiber reinforced metal matrix. Types and Properties of matrix materials and its industrial application

CERAMIC REINFORCED MATRIX: Cold pressing & sintering method, liquid silicon infiltration technique for synthesis of ceramic reinforced matrix, Types and properties of ceramic Matrix and its industrial applications.

10 Hrs

UNIT V

POLYMER COMPOSITES: Stress-Strain modulus relationship for fibre reinforced polymer composites, manufacturing methods: Hand layouts, filament winding, pultrusion, SMC and

DMC. Applications of polymer reinforced composites in marie, aerospace, automobile, building & computer industry. **06 Hrs**

TEXTBOOKS:

1. M.N. Rahaman, "Ceramic processing and sintering", 2nd Edition, Marcel Dekker, Inc, New York.
2. David Segal, "Chemical synthesis of advanced ceramic materials", Cambridge university press, Cambridge, New York.

REFERENCE BOOKS:

1. Krishan K. Chawla, "Composite Materials Science and Engineering", 2nd Edition, Springer New York Heidelberg Dordrecht London.

EBOOKS

1. Composite Materials by Dr. H. K. Shivanand and B. V. Babu Kiran, ISBN: 9788184121452
2. Composite Materials by S. C. Sharma, ISBN: 9788173192579

MOOC's & ONLINE COURSES:

1. <http://nptel.ac.in/courses/101104010/>
2. <https://www.coursebuffet.com/sub/material-science/320/composite-materials>

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, V and two questions each from Unit II and IV.

COURSE OUTCOMES (COs):

COURSE OUTCOMES		Programme Outcomes
CO1	Classify composite materials based on the Industrials applications	PO2
CO2	Apprehend and select a suitable fabrication technique for the processing of ceramic materials.	PO6
CO3	Distinguish between mechanical and chemical techniques for the fabrication of composite materials	PO3
CO4	Identify suitable instruments to measure the properties of the ceramics and other composites	PO2
CO5	Custom the synthesized metal- matrix and ceramic-matrix composite materials to use in different engineering disciplines.	PO12
CO6	Comprehend the fabrication techniques for reinforced polymer materials to demonstrate the knowledge of sustainable development.	PO7

ASSESSMENT:

Continuous Internal Assessments		Marks 100% (Weightage50%)	Assessment
Theory Component	Three Internals (Best of Two)	40%	Course Instructor
	Quiz (Two Quizzes)	10%	Course Instructor
Laboratory Component	Laboratory Component	50%	Course Instructor
Semester End Examination (Written Examination for Three Hours)			

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	HEALTH AND NUTRITION											Credits	3		
Course Code	1	9	B	T	6	O	E	H	A	N	L-T-P	3	0	0	

PRE-REQUISITES: Knowledge of Basic Sciences.

COURSE DESCRIPTION: This course deals with the basics of health and nutrition of humans. The course emphasizes on importance basic food nutrients in one's sustainable life. The course provides in depth knowledge about nutritional intake, dietary standards and food substitutes.

COURSE OBJECTIVES: To enable the students to gain knowledge on the various aspects of food nutrients, their intake and deficiency disorders.

UNIT 1 INTRODUCTION TO HUMAN NUTRITION [10 L]

A Global Perspective on Food and Nutrition, Orientation to human nutrition, An integrated approach, A conceptional framework for the study of nutrition, Relationship between nutrition and health, Nutrients: the basics: carbohydrates, lipids and proteins; Connections of Carbohydrate, Protein, and Lipid Metabolism in single Pathway; Global malnutrition, Anorexia, obesity. Relationship between nutrition science and practice, Nutrition milestones: the development of nutrition as a science, Future challenges for nutrition research and practice.

UNIT 2 BODY COMPOSITION & DIETARY REFERENCE STANDARDS [07L]

Introduction, Five levels of body composition, Relationships between different levels of body composition, Body composition techniques: Direct and indirect methods; Terminology and conceptual approaches to setting nutrient recommendations, Interpretation and uses of dietary recommendations, The use of reference values to assess the adequacy of the nutrient intakes of population groups, Methods used to determine requirements and set dietary recommendations, Methods used to determine requirements

UNIT 3 ESSENTIAL NUTRIENTS [06 L]

Vitamins: Introduction, classification, Dietary sources, uses and disorders; Minerals and Trace Elements: Introduction, classification, Dietary sources, uses and disorders;

UNIT 4 FOOD SUBSTITUTES: NATURAL VS ARTIFICIAL [06 L]

Nutritive and Non-Nutritive Sweeteners: Classification, uses, and impact; Food flavours: Classification, uses, and impact; Food colours: Classification, uses, and impact;

UNIT 5 SOCIETAL FOOD HABITS [10 L]

Studying food habits, who chooses? Social and cultural influences on food choice, Food habits in nutrition practice, Changing food habits in the modern world; Nutritional recommendations for the general population : Recommended nutrient intakes, A lower diagnostic level for assessing adequacy of nutrient intake, An upper level (UL) to control high dosage of supplements, Estimated average requirement (EAR), Optimal intake range for some essential nutrients, Dietary goals and guidelines (DGGs), Dietary guidelines for children, WHO guidelines, Can recommended nutrient intakes and dietary goals be combined? Dietary goals and guidelines in developing countries, Integrating RNIs and DGGs in nutrition promotion, Reference numbers for nutrition labelling and food standards.

PRIMARY REFERENCE BOOKS

1. Introduction to human nutrition by Michael J Gibney, Susan A Lanham-New, Aedin Cassidy, Hester H Vorster, Second edition, Wiley Blackwell, 2009.
2. Essentials of Human Nutrition, by Jim Mann, A. Stewart Truswell, second edition,Oxford university press, 2002

SECONDARY REFERENCE BOOKS

1. Principles of Human Nutrition by Martin Eastwood Edinburgh, second edition, Blackwell Science Ltd, 2003.

e-books

1. <http://faculty.sdmiramar.edu/faculty/sdccd/mmcMahon/nutrition/>
2. http://www.freebookcentre.net/medical_books_download/Nutrition-in-Health-andDiseases.html
3. http://www.freebookcentre.net/medical_books_download/The-Chemistry-of-Food-andNutrition.html

MOOCs

1. <https://www.mooc-list.com/categories/food-nutrition>
2. <https://www.mooc-list.com/tags/nutrition>
3. <https://www.my-mooc.com/en/mooc/nutrition-health-part-1-macronutrients-wageningenxnutr101x- 0/>
4. <https://www.edx.org/course/subject/food-nutrition>

COURSE OUTCOMES

1. Understand the components of basic food nutrients and their uses.
2. Apply various techniques to determine bodily composition of nutrients and impact of essential food substitutes.
3. Analyse the nature of food habits and intake, societal behaviour towards food and artificial food substitutes.
4. Communicate individually or in a team to identify and asses the case studies relevant to food habits and challenges across the globe.

Semester	VI		
Course Title	ERGONOMICS	Course Code	19ML6OE2ER
Credits	3	L-T-P	3-0-0
Pre Requisites	-----		
Course Outcomes			
CO1	Apply the knowledge of mathematics, science and engineering fundamentals to improve the human machine interaction.		
CO2	Formulate and analyse the work environment that degrade human-machine performance.		
CO3	Design and apply reasoning by the contextual knowledge to meet the needs of the users to assess health safety and ethical issues.		
CO4	Communicate and write report of the case studies for the ergonomically designed models as a teamwork.		
UNIT #			Hours
UNIT 1			8
Introduction to Ergonomics: The focus of ergonomics, Ergonomics and its areas of application in the work system, A brief history of ergonomics, Modern ergonomics, Future directions for ergonomics. Anatomy, posture and body mechanics: Anatomy of the spine and pelvis related to posture, Postural stability and postural adaptation, Low back pain, Risk factors for musculoskeletal disorders in the workplace, Behavioral aspects of posture.			
Anthropometric principles in workspace and equipment design: Designing for a population of users, sources of human variability, Anthropometry and its uses in ergonomics, Principles of applied anthropometry in ergonomics, Application of anthropometry in design, Design for everyone, Anthropometry and personal space.			
UNIT 2			8
Static work: Design for standing and seated workers: Fundamental aspects of standing and sitting, An ergonomic approach to workstation design, Design for standing workers, Design for seated workers, Work surface design, Visual display units, Guidelines for the design of static work.			
Design of repetitive tasks: Introduction to work-related musculoskeletal disorders, Injuries to the upper body at work, Review of tissue path mechanics and WMSDs, Disorders of the neck, Carpal tunnel syndrome, Tennis elbow (epicondylitis), disorders of the shoulder, Lower limbs, Ergonomic interventions, Trends in work-related musculoskeletal disorders. Design of manual handling tasks.			
UNIT 3			7
Work capacity, stress and fatigue: Stress and fatigue, Muscles, structure, function and capacity, Physical work capacity, Factors affecting work capacity. Industrial applications of physiology.			
Heat, cold and the design of the physical environment: Fundamentals of human thermoregulation, measuring the thermal environment,			

Thermoregulatory mechanisms, Work in hot climates, work in cold climates, Skin temperature, Protection against extreme climates, Comfort and the indoor climate, ISO standards.		
UNIT 4		8
Vision, light and lighting: Vision and the eye, Measurement of light, lighting design considerations, Visual fatigue, eye strain and near work, Psychological aspects of indoor lighting. Hearing, sound, noise and vibration: Terminology, Measurement of sound, Ear protection, Design of the acoustic environment, Industrial noise control, Noise and communication, The auditory environment outdoors, Effects of noise on task performance, Non-auditory effects of noise on health, Noise and satisfaction, Vibration, Human information processing, skill and performance.		
UNIT 5		8
Displays, controls and virtual environments: Principles for the design of visual displays, Auditory displays, Design of controls, Combining displays and controls, Virtual ('synthetic') environments. Human-computer interaction, memory and language: Human-centred design processes for interactive systems, Designing information in external memory stores, Human-computer dialogues, Memory and language in everyday life. Human-machine interaction, human error and safety: Human error and equipment design, Mental workload in human machine interaction, Psychological aspects of human error, Characterising human-machine interaction, GOMS, Prevention of error in human-machine interaction, Accidents and safety.		
TEXT BOOKS		
1	Introduction to Ergonomics by R.S. Bridger, Taylor & Francis, 2003. eBook Published 26 June 2008.	
REFERENCE BOOKS		
1	Introduction to Human factors and ergonomics for Engineers, 2nd Edition, Marks Lehto, Steven J Landry. CRC press, Taylor and Francis group, 2013	
2	Handbook of Human Factors and Ergonomics, 4th Edition, Gavriel Salvendy, March 2012.	
3	Handbook of Human Factors and Ergonomics in Health Care and Patient Safety, Pascale Carayon, First Edition-2012, eBook Published-19 April 2016, CRC Press	
ONLINE COURSE		
1	https://www.derby.ac.uk/online/ergonomic-courses/ergonomics-human-factors-pg-cert-online/ code: 7PS568	
2	https://engineering.psu.edu/online/courses/human-factors-engineering code: IE57700	
E-BOOKS:		
1	https://moodle.ufsc.br/mod/resource/view.php?id=387317	

Course Title	MULTI DOMAIN SYSTEM MODELLING				
Course Code	19EI6DE2MD	Credits	3	L-T-P	3:0:0
CIE	100 Marks (50% weightage)	SEE	100 Marks (50% weightage)		
Prerequisites: Control Systems, Signals and Systems					
UNIT-I				7 Hours	
<p>Introduction to Cyber Physical Systems and multi-domain modelling: Mathematical modelling of dynamical systems. Mathematical models. First-order linear ODE models. General first-order ODE models. Higher-order ODE models. Laplace transform. Multivariable ODE models. Symbolic, graphical and numerical computation. Review of the main elements of mathematical modelling for dynamical systems with lumped parameters.</p>					
UNIT-II				8 Hours	
<p>Introduction to Differential Algebraic Equations: Installation and basic usage of the scientific computing tools, SCILAB and OpenModelica.</p> <p>Numerical Simulation of dynamical systems: Introduction to numerical methods. Basic usage of Scilab. Numerical ODE solving. ODE solving with Scilab. Solving ODE systems with Scilab. Numerical simulation with Xcos</p>					
UNIT-III				8 Hours	
<p>Modelling and simulation of multi-domain systems with Modelica: Basic elements of the Modelica language. Physical modelling and simulation with OpenModelica. Simulation of mechanical oscillators with OpenModelica. Simulation of Electrical systems.</p>					
UNIT-IV				8 Hours	
<p>Applying OM Libraries: Blocks, Basic input/output control blocks (continuous, discrete, logical, table blocks), Complex Blocks, Basic input/output control blocks with Complex signals , Electrical, Magnetic and Mechanics Libraries..</p>					
UNIT-V				8 Hours	
<p>Application of Modelica: Modelling of Mechanical Vibrations and System, Modelling, Application of Modelica in Automotive applications, Modelica in Avionics, Modelica in Bio</p>					

mechanics.

Text Books :

- | | |
|----|--|
| 1. | Campbell, S. L.; Chancelier, J. P.; Nikoukhah, R. Modeling and simulation in Scilab/Scicos [on line]. New York: Springer, 2006 [Consultation: 23/01/2019]. |
| 2. | Introduction to Modeling and Simulation of Technical and Physical Systems with Modelica. Peter Fritzson., 2011eboo |

References:

- | | |
|----|--|
| 1. | Principles of Object-Oriented Modeling and Simulation with Modelica 3.3: A Cyber-Physical Approach, Peter Fritzson 2015. |
| 2. | Introduction to Modelica, Michael Tiller |

E-References:

- | | |
|----|---|
| 1. | http://dx.doi.org/10.1007/0-387-30486-X . ISBN 9780387278025. |
| 2. | http://eu.wiley.com/WileyCDA/WileyTitle/productCd111801068X.html |

Internal choice: Unit -II & IV**Course outcomes:**

The course outcomes will be attained through theory and laboratory assessments.

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

CO1: Formulate suitable mathematical models for different types of dynamical systems.

CO2: Apply the open-source computer tools Scilab to model and simulate dynamic systems of special relevance in engineering.

CO3: Use the Modelica simulation language, in particular its open-source implementation OpenModelica, to model and simulate complex and multi-domain physical systems



BMS COLLEGE OF ENGINEERING, BENGALURU-19
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DEPARTMENT OF MATHEMATICS

SYLLABUS (2021 - 2022)

SIXTH SEMESTER – INSTITUTIONAL ELECTIVE

Course Title	NUMERICAL METHODS FOR ENGINEERS	Course Code	20MA6IENME
Credits	03	L – T – P	3 – 0 – 0
Contact hours	39 hours		

Prerequisites: Matrix theory, Differential and Integral Calculus, Differential Equations.

Course Objectives: The purpose of the course is to encourage the students to apply numerical techniques. To enhance computational skills for solving mathematical equations. To train the students to solve the complex engineering problems in their respective domain.

UNIT-1

ITERATIVE METHODS FOR SYSTEM OF EQUATIONS AND EIGEN VALUES AND VECTORS: [07 hours]

Fixed point iteration methods, Thomas algorithm for tri-diagonal systems, Newton's method for solving nonlinear systems,
Power Method, Rayleigh Power method, Jacobi's Methods, Given's Method.

UNIT-2

INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION: [08 hours]

Linear interpolation, Piecewise polynomial interpolation: Cubic spline interpolation.

Stirling's formula and Bessel's formula. Richardson extrapolation.

Boole's and Romberg integration. Evaluation of Double Integrals using Numerical Methods – Trapezoidal Rule - Simpson's Rule.

UNIT-3

METHODS FOR INITIAL VALUE PROBLEMS: [08 hours]

Predictor–Corrector methods- Milne's method –Adam's Bashforth method. Finite difference methods. Relaxation Methods; Solution of Eigen value problems (ODE). Solving system of ODE using Runge-Kutta 2nd and 4th order methods.

UNIT-4

METHODS FOR BOUNDARY VALUE PROBLEMS: [08 hours]

Introduction to boundary value problem (BVP): Solving BVP using Shooting method, Finite difference method, cubic spline method and successive over Relaxation (SOR) method.
Solution of integral equations using finite difference method.



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UNIT-5

METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS: [08 hours]

Solution of Elliptic PDEs, Poisson's equations, Finite difference method for 1D elliptic problem, Finite difference method for 2D elliptic problem, Finite difference for parabolic problems (generality), Lax-Wendorff method, ADI method and SOR Method.

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

Course Code	CO #	COURSE OUTCOME (CO)	PO	Bloom's level
20MA6IENME	CO 1	Determine the solution of the non-linear system of equations	1, 2, 5	3
	CO 2	Compute the Eigen values and corresponding Eigen vectors using iterative methods	1, 2, 5	3
	CO 3	Apply numerical techniques to find differentiation and integration.	1, 2, 5	3
	CO 4	Interpret the solutions of ordinary differential equations	1, 2,3,5	3
	CO 5	Analyze the numerical solutions of partial differential equations	1, 2,3,5	3

Text Books:

1. MK Jain, SRK Iyengar and R.K.Jain, Numerical Methods for Scientific and Engineering Computations, 6th edition, 2007, New Age International Publishers.
2. S.S.Sastry, Introductory methods of numerical analysis, Fifth Edition, 2012, PHI Publishers

Reference Books:

1. Steven V. Chapra, Applied Numerical Methods with Matlab for Engineers and Scientists, Third Edition, 2011, McGraw-Hill Edition.
2. Richard L. Burden, Douglas J. Faires, A.M.Burden, Numerical Analysis, 10th Edition, 2010, Cengage Publishers.
3. M.D. Raisinganiah, Integral Equations and Boundary Value Problems, S.Chand Publishers.

E books and online course materials:

1. <https://www.classcentral.com/course/swayam-numerical-methods-for-engineers-14213>

Online Courses and Video Lectures:

1. https://onlinecourses.nptel.ac.in/noc19_ge30/preview
2. <https://ocw.mit.edu/courses/mechanical-engineering/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/>

Question Paper Pattern:

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

BMS COLLEGE OF ENGINEERING, BASAVANGUDI

Department of Management Studies & Research Centre

OPEN ELECTIVE FOR 6th SEMESTER B.E.

Course	HUMAN BEHAVIOUR AT WORK	Course Code	20MB6OE1HB	SEE Duration	3 Hours	Total No. of Lecture Hours
Credits	03	L-T-P hours	3-0-0	CIE+ SEE	50 + 50	39

UNIT I **4 hours**

Organizational Behavior (OB) – Introduction, definition, goals, elements, contributing disciplines to OB , Challenges and Opportunities of O.B, The future of OB.

UNIT II **6 hours**

Individual Behaviour: Introduction, foundations of individual behavior

Personality: Definition, determinants, types, Big Five model of personality, personality traits influencing OB. Understanding self-awareness through JOHARI Window

To administer instruments to measure personality – Big 5 model

UNIT III **11 hours**

Emotions: meaning, types of emotions, dimension of emotions, emotional labour, Intelligence quotient V/s emotional intelligence

Attitudes and Values: Definition, sources of attitudes, types of attitudes, changing attitudes, work related attitudes. Definition of values, importance of values, sources of our value systems, types of values.

To administer instrument to measure Emotional quotient

UNIT IV **10 hours**

Leadership: Key Elements of Leadership –Types of Leaders, Traits of an effective leader. Basic theories of leadership- trait, behavioral - Managerial Grid, and situational leadership – Hershey Blanchard theory

Motivation: Meaning, theories of motivation-needs theory, two factor theory, Theory X and Y, ERG model

Group dynamics: Importance, types of groups, group formation, Group V/s Teams, group decision making techniques, building effective teams.

Employee stress: Eustress and Distress, causes, approaches to handling Stress

UNIT V **8 hours**

Organizational culture: Importance of culture, types of culture,

Organization change: Need for organizational change, types of change, resistance to change,

Managing Diversity in Behaviour: The Nature of Diversity, Reasons for the Emergence of Diversity, Managing Diversity.

Course Outcomes: Upon completion of the course, students will have the ability to:

CO1	To understand and apply behavioral science knowledge to solve people related problems.
CO2	Analyse the behavioral dimensions of individuals which have far reaching significance in the direction of organizational effectiveness
CO3	Nurture leadership skills required to manage the team effectively, in order to achieve
CO4	Inculcate critical thinking skills in students to enable them to analyze cases enabling them to make presentations.

RECOMMENDED BOOKS

1. Organizational Behaviour - Stephen Robbins Et Al - Pearson Education, 12th Edition

REFERENCE BOOKS

1. Organization Behaviour – Hellierigel Slocum Woodman - Cengage Learning, 10 e, 2004
2. Organizational Behaviour – An evidence Based Approach – Indian edition – McGraw hill 12th Edition.

Information Technology Law

OBJECT:

New World requires the new Normal. Use of Communication with the advanced gadgets have improved in many ways. Advancement in the technology has brought the Benefits and the problems to the people. To solve the Problems raised by the development in the technology, learning the laws, and the relevant concepts are basic need of the hour.

As most of the activities are part of the computer and the mobile network are changed. The commission of such cyber crimes have also been changed drastically. Thus, to sensitize the engineering students with the recent development in the law and the engineering stream the subject for the electives in the branch

UNIT I

Introduction to the Information Technology Law. Birds eye view of the Information Technology Act, 2000. Nature and Scope of the Information Technology Law Act. Regulatory and Dispute settlement mechanism, 2000. Recent amendments to the act and the present case laws.

UNIT II

Meaning and definition of Cyber-crimes. Relevance of actus reus and Mens Rea in Cyber-crimes. Nature and types of the crimes. Hacking, Data theft, Cyber Fraud, Cyber Stalking, Cyber terrorism and other cyber-crimes. Relevant provisions from the Indian penal Code with Relevant cases.

UNIT III

Privacy in the Cyber World, Data Protection Principles, Privacy rights of Data Subjects. Cyber Laws Issues in the Present World. E- Evidence and Investigation of the Cybercrimes.

UNIT IV

Offences, Detection and Investigation of the offences under the act. Penalties and rule making power, Search and Seizure of the property.

UNIT V

Electives for the Engineering Department

Need for Uniform IT Law. Harmonization of Information Technology. Relevant Conventions and treaties on the IT Law. Freedom of speech and Human rights in the Internet. Issues of social media and the laws governing.

References.

1. Nadan Kamath - Law relating to Computers Internet & E Commerce
2. N S Nappinani – Technology Laws Decoded
3. Pavan Duggal - Cyber Law: The Indian Perspective
4. D P Mittal- Law of information Technology
5. Rodney Ryder - Intellectual Property and the Internet

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

		6th Semester	
Course Title:	Programming using Java	CIE - 50 M	SEE – 50 M
Course Code:	21CA6OE1JP		
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, 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 Handling 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, 6th edition, 2019.

Reference Books:

1. Herbert Schildt, "Java The Complete Reference", 11th Edition, Comprehensive Coverage of Java Language, Oracle Press, McGraw Hill Education (India Edition) 2019.
2. Hari Mohan Pandey, "Java Programming", 1st Impression, 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 per the 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 as per 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%