

SEMESTER III

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory							
1	PE	PCE1955*	Professional Elective V	3	0	0	3
2	OE	*****	Open Elective	3	0	0	3
Practical							
3	PROJ	PCE19301	Dissertation I	0	0	20	10
TOTAL				6	0	20	16

SEMESTER IV

S.No.	Category	Course Code	Course Title	L	T	P	C
Practical							
1	PROJ	PCE19401	Dissertation II	0	0	32	16
TOTAL				0	0	32	16

PROFESSIONAL ELECTIVE I

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	PE	PCE19151	Data Preparation and Analysis	3	0	0	3
2.	PE	PCE19152	Secure Coding	3	0	0	3
3.	PE	PCE19153	Introduction to Intelligent Systems	3	0	0	3
4.	PE	PCE19154	Pattern Recognition	3	0	0	3

PROFESSIONAL ELECTIVE II

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	PE	PCE19251	Storage Area Network	3	0	0	3
2.	PE	PCE19252	Data Storage Technologies and Network	3	0	0	3
3.	PE	PCE19253	Ethical Hacking	3	0	0	3
4.	PE	PCE19254	Data Virtualization Techniques	3	0	0	3

PROFESSIONAL ELECTIVE III

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	PE	PCE19351	Knowledge Discovery	3	0	0	3
2.	PE	PCE19352	Secure Software Design and Enterprise Computing	3	0	0	3
3.	PE	PCE19353	Computer Vision	3	0	0	3
4.	PE	PCE19354	Software Design	3	0	0	3

PROFESSIONAL ELECTIVE IV

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	PE	PCE19451	Human and Computer Interaction	3	0	0	3
2.	PE	PCE19452	GPU Computing	3	0	0	3
3.	PE	PCE19453	Digital Forensics	3	0	0	3
4.	PE	PCE19454	Advanced wireless and mobile networks	3	0	0	3

PROFESSIONAL ELECTIVE V

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	PE	PCE19551	Mobile Application and Services	3	0	0	3
2.	PE	PCE19552	High Performance Computing	3	0	0	3
3.	PE	PCE19553	Cryptocurrency and Blockchain Technologies	3	0	0	3
4.	PE	PCE19554	Agile Software Development	3	0	0	3

AUDIT COURSE I

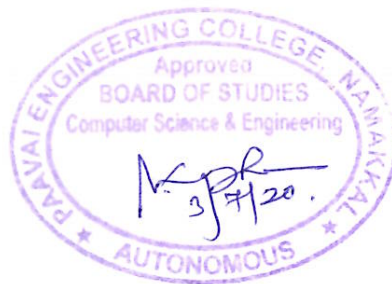
S.No.	Category	Course Code	Course Title	L	T	P	C
1.	AC	PEN19171	English for Research Paper Writing	3	0	0	3
2.	AC	PEN19172	Disaster Management	3	0	0	3
3.	AC	PEN19173	Sanskrit for Technical Knowledge	3	0	0	3
4.	AC	PEN19174	Value Education	3	0	0	3

AUDIT COURSE II

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	AC	PEN19271	Pedagogy Studies	3	0	0	3
2.	AC	PEN19272	Constitution of India	3	0	0	3
3.	AC	PEN19273	Stress Management by Yoga	3	0	0	3
4.	AC	PEN19274	Personality Development Through Life Enlightenment Skills	3	0	0	3

OPEN ELECTIVE

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	OE	PMA19901	Operations Research	3	0	0	3
2.	OE	PCE19901	Business Analytics	3	0	0	3
3.	OE	PSE19901	Cost Management of Engineering Projects	3	0	0	3
4.	OE	PED19901	Industrial Safety	3	0	0	3
5.	OE	PED19902	Composite Materials	3	0	0	3
6.	OE	PED19903	Waste to Energy	3	0	0	3



COURSE OBJECTIVES

To enable the students to

- apply the fundamental knowledge for understanding state of the art information about any topic relevant to curriculum
- identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literatures.
- develop the methodology to solve the identified problems.
- prepare the project reports and face reviews and viva-voce examination.

SYLLABUS

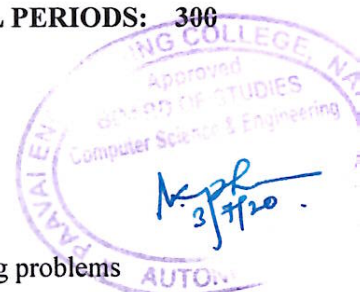
The student individually works on a specific topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

TOTAL PERIODS: 300

COURSE OUTCOMES

Upon the completion of this course, the students will be able to

- reviewed computer science and engineering problems available in literature
- select appropriate techniques to analyse the complex computer engineering problems
- apply engineering and management principles through efficient handling of project have a clear idea of his/her area of work and they are in a position to carry out the work in a systematic way.
- write a detailed report about the topic in the prescribed format

**CO-PO MAPPING**

Mapping of Course Objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3–Strong, 2–Medium, 1–Weak														
Cos	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	3	-	2	1	2	3	2	1	3	3	3
CO2	3	3	1	3	-	-	1	-	3	-	1	3	3	3
CO3	2	2	2	-	-	2	1	2	2	2	1	3	3	3

COURSE OBJECTIVES

To enable the students to

- carry out analytical and/or experimental research oriented work in the field of computer engineering.
- formulate / define the problem for dissertation.
- solve the identified problem based on the formulated methodology.
- develop skills to analyse and discuss the test results and make conclusions.

SYLLABUS

The student should continue the phase I work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated through based on the report and the viva-voce examination by a panel of examiners including one external examiner.

TOTAL PERIODS: 480

COURSE OUTCOMES

At the end of this course, students will be able to

- take up any challenging practical problem and find better solutions.
- interpret, discuss, debate and draw conclusions.
- implement concepts, tools and techniques to do quality projects.
- testing, analyse and prepare the report for a given project, write and present technical paper based on the research work.

**CO-PO MAPPING**

CO/PO Mapping (1-Low; 2- Medium; 3-High)														
COs	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	3	3	3	3	-	-	3	3	3
CO2	3	-	-	3	3	3	-	-	3	-	-	3	3	3
CO3	2	-	-	3	3	3	-	-	3	-	-	2	2	2
CO4	1	-	-	2	2	2	-	-	2	1	1	1	1	1
CO5	3	1	1	1	1	1	1	1	1	-	-	-	-	-

COURSE OBJECTIVES

To enable students to

- understand development framework and the need for mobile applications.
- create applications with layouts, framework.
- develop applications with intents and broadcast receivers.
- develop applications with database connectivity.
- develop applications to improve user experience.

UNIT I INTRODUCTION**9**

Android- An Open Platform for Mobile Development, android SDK features, introducing the development framework, developing for android, developing for mobile and embedded devices, types of android applications, android development tools.

UNIT II CREATING APPLICATIONS AND ACTIVITIES**9**

Introducing the Application Manifest File - Using the Manifest Editor, externalizing resources, android application lifecycle, introducing the android application class, android activities, fundamental android UI design, android user interface fundamentals, introducing layouts, introducing fragments, creating new Views, introducing adapters.

UNIT III INTENTS AND BROADCAST RECEIVERS**9**

Introducing Intents - Creating Intent Filters and Broadcast Receivers, using internet resources, using the download manager, using internet services, connecting to google app engine.

UNIT IV DATABASES AND CONTENT PROVIDERS**9**

Saving Simple Application Data - Creating, saving and retrieving shared preferences, working with the file systems, introducing android databases, introducing sqlite, content values and cursors, working with sqlite databases, creating content providers, using content providers, adding search to applications.

UNIT V EXPANDING THE USER EXPERIENCE**9**

Working in the background - Creating and using menus and action bar action items, introducing dialogues, notifications, advanced user experience, hardware sensors, using sensors and sensor manager.

TOTAL PERIODS: 45**COURSE OUTCOMES**

Upon the completion of the course, the students will be able to

- understand development framework and the need for mobile applications.
- design applications with layouts, framework.
- design with intents and broadcast receivers.
- design applications with database connectivity.
- design applications to improvise user experience.

REFERENCES

1. Reto Meier, "Professional Android Application Development", Wiley, 2012.

CO-PO MAPPING

CO/PO Mapping (1-Low; 2- Medium; 3-High)														
COs	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	3	-	3	3	-	3	1	-	3	3	-	3
CO2	-	3	3	-	1	3	-	3	1	-	3	3	-	3
CO3	-	2	2	-	2	2	-	2	2	-	2	2	-	2
CO4	-	3	1	-	3	3	-	3	1	-	3	3	-	3
CO5	-	3	3	-	3	3	-	3	1	-	3	3	-	3



COURSE OBJECTIVES

To enable the students to

- learn about Modern processors and concepts
- understand the concepts of optimizations techniques.
- learn about parallel computer concepts.
- understand the concept of memory parallel programming using Open MP.
- study about distributed-memory parallel programming and MPI

UNIT I MODERN PROCESSORS 9

Stored Program Computer Architecture- General purpose cache-based microprocessor, performance based metrics and benchmarks, moore's law, pipelining, superscalarity, SIMD, memory hierarchies, multicore processors, multithreaded processors, vector processors.

UNIT II BASIC OPTIMIZATION TECHNIQUES FOR SERIAL CODE 9

Scalar profiling - Common sense optimizations- simple measures, large impact, the role of compilers, general optimization options, inlining, aliasing, computational accuracy, register optimizations, using compiler logs, C++ optimizations, temporaries, dynamic memory management, loop kernels and iterators, Case study-Sparse matrix, vector multiply.

UNIT III PARALLEL COMPUTERS 9

Taxonomy of parallel computing paradigms- Shared memory computers, distributed-memory computers, hierarchical systems, networks, basic performance characteristics, buses, switched and fat, tree networks, mesh networks, hybrids, basics of parallelization, why parallelize, data parallelism, function parallelism, parallel scalability.

UNIT IV SHARED MEMORY PARALLEL PROGRAMMING WITH OPENMP 9

Introduction to OpenMP - Parallel execution, data scoping, openmp work sharing for loops, synchronization, reductions , loop scheduling , tasking , Case study- openmp, parallel jacobi algorithm, advanced openmp wavefront parallelization, efficient openmp programming, profiling openmp programs, performance pitfalls, Case Study- Parallel sparse matrix, vector multiply.

UNIT V DISTRIBUTED-MEMORY PARALLEL PROGRAMMING WITH MPI 9

Message passing - Introduction to MPI- MPI parallelization of jacobi solver (mpi implementation, performance properties). efficient mpi programming, mpi performance tools, communication parameters- synchronization, serialization, contention, reducing communication overhead, understanding intra node point-to-point communication.

TOTAL PERIODS: 45

COURSE OUTCOMES

Upon the completion of this course, the students will be able to

- familiar with the modern processors.
- apply the methods of optimization techniques
- develop the knowledge in parallelization concepts.
- analyze shared memory parallel programming algorithm and its performance
- design applications Using distributed-memory parallel programming and MPI

REFERENCES

1. Georg Hager, Gerhard Wellein, "Introduction to High Performance computing for Scientists and Engineers", Chapman & Hall / CRC Computational Science series, 2011
2. Applied Parallel Computing, by Y. Deng World Scientific, 2011
3. Introduction to High Performance Scientific Computing, by V. Eijkhout et al. Creative Commons, 2015
4. Petascale Computing: Algorithms and Applications, by D. Bader, ed. Chapman and Hall, 2008

CO-PO MAPPING

CO/PO Mapping (1-Low; 2- Medium; 3-High)														
COs	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	1	2	2	-	-	-	3	2	-	3	3	3
CO2	2	1	3	2	3	-	2	-	1	-	-	2	2	2
CO3	2	1	2	2	2	-	-	1	2	-	-	2	2	2
CO4	3	3	3	3	3	-	-	-	3	-	-	3	3	3
CO5	2	2	2	2	2	-	-	-	2	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- understand the mechanism of cryptography in cryptocurrency.
- understand the functionality of current implementation of blockchain technology.
- understand the required cryptographic background.
- explore the applications of blockchain to cryptocurrencies.
- understanding limitations of current blockchain technology.

UNIT I INTRODUCTION TO CRYPTOGRAPHY AND CRYPTOCURRENCIES 9

Cryptographic hash functions, hash pointers and data structures, digital signatures, public keys as identities, a simple cryptocurrency.

UNIT II HOW BLOCKCHAIN ACHIEVES AND HOW TO STORE AND USE 9

Decentralization-centralization vs. decentralization-distributed consensus, consensus with- out identity using a blockchain, incentives and proof of work. simple local Storage, hot and cold storage, splitting and sharing keys, online wallets and exchanges, payment services, transaction fees, currency Exchange markets. Bitcoin transactions, bitcoin scripts, applications of bitcoin scripts, bitcoin blocks, the bit- coin network, limitations and improvements.

UNIT III MECHANICS OF BITCOIN 9

Bitcoin transactions, Bitcoin Scripts, Applications of Bitcoin scripts, Bitcoin blocks, The Bit- coin network, Limitations and improvements.

UNIT IV BITCOIN MINING AND ANONYMITY 9

The task of Bitcoin miners, mining hardware, energy consumption and ecology, mining pools, mining incentives and strategies - anonymity basics, how to de-anonymize bitcoin, mixing, decentralized mixing, zerocoin and zerocash.

UNIT V COMMUNITY, POLITICS AND REGULATION 9

Consensus in Bitcoin, Bitcoin Core Software, Stakeholders: Who's in Charge, Roots of Bitcoin, Governments Notice on Bitcoin, Anti Money Laundering Regulation, New York's Bit License Proposal. Bitcoin as a Platform: Bitcoin as an Append only Log, Bitcoins as Smart Property, Secure Multi Party Lotteries in Bitcoin, Bitcoin as Public Randomness, Source-Prediction Markets, and Real World Data Feeds.

TOTAL PERIODS: 45

COURSE OUTCOMES

Upon the completion of this course, the students will be able to

- understand and apply the fundamentals of cryptography in cryptocurrency
- gain knowledge about various operations associated with the life cycle of blockchain and cryptocurrency
- deal with the methods for verification and validation of bitcoin transactions.
- demonstrate the general ecosystem of several cryptocurrency.
- educate the principles, practices and policies associated bitcoin business.

REFERENCES

1. Narayanan, A., Bonneau, J., Felten, ., Miller, A., and Goldfeder, S. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press (2016).
2. Antonopoulos, A. M. Mastering Bitcoin: unlocking digital cryptocurrencies. OReilly Media, Inc. (2014).
3. Franco, P. Understanding Bitcoin: Cryptography, engineering and economics. John Wiley and Sons (2014).

CO-PO MAPPING

CO/PO Mapping (1-Low; 2- Medium; 3-High)														
COs	Programme Outcomes (POs)													
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CO1	3	3	3	3	3	-	-	-	3	-	-	3	3	3
CO2	3	3	3	3	3	-	-	-	3	-	-	3	3	3
CO3	2	2	2	2	2	-	-	-	2	-	-	2	2	2
CO4	1	1	1	-	-	-	-	-	2	1	1	1	1	1
CO5	2	3	3	1	-	-	-	-	-	-	-	-	-	-



COURSE OBJECTIVES

To enable the students to

- study pioneer of agile software development model.
- study fundamental concepts in extreme programming including software testing, process, criteria, strategies, and models.
- discuss various scrum practices, tools and various application case studies.
- learn various agile software methodologies and its comparisons.
- expose software process development and engineering.

UNIT I AGILE PRINCIPLES AND MODELING 9

Introduction - Traditional, IID and agile methodologies, comparison, need – manifesto, values and practices, agile modeling values, principles and practices, agile modeling with RUP.

UNIT II EXTREME PROGRAMMING 9

Life Cycle – User Stories, architecture, planning, iteration, testing, release, XP values, XP practices, planning, coding, pair programming model, refactoring, agile modeling and XP.

UNIT III SCRUM PRINCIPLES 9

Introduction – Practices, applying scrum, need, scrum values, practices, tools in agile software development, case study, applying scrum for IoT projects, applying scrum for big data projects.

UNIT IV OTHER AGILE DEVELOPMENT METHODOLOGIES 9

FDD – DSDM-lean and kanban software development, comparison of agile approaches, case studies, defining data warehousing projects for iterative development, user stories, agile estimation, adapting iterative development for data warehousing projects.

UNIT V AGILE REVIEW AND IMPLEMENTATION 9

Case Study- Exploring the tools related to agile development and approached case study using this technology , roles related to the lifecycle, differences between agile and traditional plans, differences between agile plans at different lifecycle phases; testing plan links between testing - roles and key techniques, principles - understand as a means of assessing the initial status of a project/ how agile helps to build quality.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- understand the agile software development process and modeling.
- acquire fundamental enabling techniques and scalable algorithms of extreme programming.
- apply the concept of scrum principles and practices.
- outline the concepts of various agile development methods.
- able to understand modern agile development and service oriented architecture concept of industry.

TEXT BOOKS

1. Robert Martin, "Agile Software Development: Principles, Patterns, and Practices", Pearson Education Ltd., 2014.
2. Jim Highsmith, "Agile Data Warehousing Project Management", Morgan Kaufmann, 2012.
3. Alistair Cockburn, "Agile Software Development: The Cooperative Game", Pearson Education, USA, 2006.
4. Scott Ambler, "Agile Modeling: Effective Practices for eXtreme Programming and the Unified Process", Wiley Computer Publishing, 2002.
5. Ken Schwaber and Mike Beedle, "Agile Software Development with Scrum", Prentice Hall, USA, 2001.

CO-PO MAPPING

CO/PO Mapping (1-Low; 2- Medium; 3-High)														
COs	Programme Outcomes (POs)													
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CO1	3	3	3	3	3	3	3	3	3	-	-	3	3	3
CO2	3	3	3	3	3	3	3	3	3	-	-	3	3	3
CO3	2	2	2	2	2	2	2	2	2	-	-	2	2	2
CO4	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO5	3	3	3	3	3	3	3	3	3	-	-	-	-	-



COURSE OBJECTIVES

To enable the students to

- understand the mathematical formulation of real-world problems as a linear programming model and apply the theoretical workings of the graphical and simplex method.
- develop various constructive techniques of Transportation and Assignment models to make effective business decisions.
- introduce the concepts of nonlinear programming problem to develop the quantitative tools for identifying, analyzing and practicing strategic decisions.
- develop various constructive techniques for the field of inventory and production management.
- impart knowledge to manage the project analysis by network models and organize the tools and techniques of CPM and PERT.

UNIT I LINEAR PROGRAMMING

9

Principal components of decision problem, modeling phases, LP Formulation and graphic solution, Resource allocation problems, Simplex method.

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS

9

Mathematical formulation of transportation problem; Methods for finding initial basic feasible solution, optimum solution, degeneracy; Mathematical formulation of assignment models - Hungarian Algorithm, variants of the Assignment problem.

UNIT III CLASSICAL OPTIMISATION THEORY

9

Nonlinear programming problem, Kuhn-Tucker conditions min cost flow problem, max flow problem.

UNIT IV INVENTORY MODELS

9

Inventory models, Economic order quantity models, Quantity discount models, Stochastic inventory models, Multi product models, Inventory control models in practice.

UNIT V NETWORKING MODELS

9

Network diagram representation, Critical path method, Time charts and resource levelling, PERT.

TOTAL PERIODS: 45**COURSE OUTCOMES**

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

- demonstrate the mathematical formulation of real-world problems as a linear programming model and apply the theoretical workings of the graphical and simplex method.

- determine the optimal solution of maximizing the profit and minimizing the cost of both transportation and assignment problems.
- develop mathematical skills to analyse and solve Nonlinear programming problem.
- determine the optimization concepts in inventory control models.
- use CPM and PERT techniques to plan, schedule and Control project activities.

REFERENCES

1. Taha H.A., "Operations Research: An Introduction " 10th Edition, Pearson Education, 2017.
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2013.
3. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3rd Edition, 2013.
4. John W. Chinneck "Feasibility and Infeasibility in Optimization Algorithms and Computational Methods", Springer, 2013.
5. Ravindran, Phillips, Solberg, "Operations Research: Principles and Practice", 2nd Edition, JohnWiley & Sons, 2012.

CO-PO MAPPING

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CO2	2	3	2	2	-	-	-	-	-	-	-	2	3	3
CO3	3	3	3	3	-	-	-	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	3



COURSE OBJECTIVES

To enable the students to

- analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
- gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- become familiar with processes needed to develop, report, and model business data.
- analyze and solve problems from different industries such as manufacturing, service, retail, banking and finance, sports, pharmaceutical, aerospace etc.
- use decision-making tools/operations research techniques.

UNIT I INTRODUCTION 9

Business analytics- Overview of business analytics, scope of business analytics, business analytics process, relationship of business analytics process and organization, competitive advantages of business analytics; Statistical Tools- Statistical notation, descriptive statistical methods- data mining introduction.

UNIT II ANALYSIS 9

Trendiness and Regression Analysis- Modeling relationships and trends in data, business analytics personnel, data and models for business analytics, problem solving, visualizing and exploring data, business analytics technology.

UNIT III MODELLING 9

Organization Structures of Business analytics; Team management; Management Issues; Designing Information Policy; Outsourcing; Ensuring Data Quality; Measuring contribution of Business analytics; Managing Changes.

UNIT IV FORECASTING 9

Forecasting Techniques- Qualitative and Judgmental Forecasting, statistical forecasting models, forecasting models for stationary time series, forecasting time series with seasonality, regression forecasting with casual variables. Monte Carlo Simulation - Monte carlo simulation using analytic solver platform, new-product development model, newsvendor model, overbooking model, cash budget model

UNIT V DECISION MAKING 9

Decision Analysis- Formulating decision problems, decision strategies with the without outcome probabilities, decision trees, value of information, utility and decision making.

TOTAL PERIODS: 45

COURSE OUTCOMES

Upon the completion of this course, the students will be able to

- understand the knowledge of data analytics.
- demonstrate the ability of think critically in making decisions based on data and deep analytics.
- demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- demonstrate the ability to translate data into clear, actionable insights.
- understand the concept of decision making.

REFERENCES

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dar G.Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.
3. The PMI guide to Business Analysis
4. Business Analysis for Practitioners: Practice Guide
5. Agile and Business Analysis Practical guidance for IT Professionals

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CO3	2	2	2	3	1	1	-	1	2	-	-	2	2	2
CO4	2	2	2	3	1	1	-	1	2	-	-	2	2	1
CO5	2	2	2	2	1	1	-	1	2	-	-	2	2	1



COURSE OBJECTIVES

To enable the students to,

- understand the costing concepts and their role in decision making
- apply project management concepts while selecting various projects
- interpret costing concepts with project execution
- analyze costing techniques and various budgetary control techniques which used in service sector
- compute solution for quantitative techniques in cost management

UNIT I INTRODUCTION 9

Costing System- Objectives of a Costing System, Cost concepts in decision-making, Relevant cost, Differential cost, Incremental cost and Opportunity cost; Creation of a Database for operational control.

UNIT II PROJECT MANAGEMENT 9

Project - meaning, Different types, why to manage, cost overruns centres, various stages of project execution, conception to commissioning; Project execution as conglomeration of technical and nontechnical activities, Detailed Engineering activities, Pre project execution main clearances and documents; Project team- Role of each member; Importance Project site- Data required with significance, Project contracts.

UNIT III PROJECT EXECUTION AND COSTING CONCEPT 9

Project execution - Project cost control, Bar charts and Network diagram, Project commissioning; mechanical and process, Cost Behavior and Profit Planning - Marginal Costing, Distinction between Marginal Costing and Absorption Costing, Break-even Analysis, Cost-Volume-Profit Analysis, Various decision-making problems; Pricing strategies- Pareto Analysis, Target costing, Life Cycle Costing.

UNIT IV COSTING OF SERVICE SECTOR AND BUDGETERY CONTROL 9

Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Activity- Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis; Budgetary Control- Flexible Budgets; Performance budgets; Zero-based budgets.

UNIT V QUANTITATIVE TECHNIQUES FOR COST MANAGEMENT 9

Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

TOTAL PERIODS: 45

COURSE OUTCOMES

Upon the completion of this course, the students will be able to

- apply the costing concepts in decision making
- select various projects based on project management concepts
- execute the project with optimum costing concept
- use costing techniques and various budgetary control techniques in service sector
- solve quantitative techniques CPM/PERT in cost management.

REFERENCES

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi, 2018.
2. Charles T. Horngren and George Foster, Advanced Management Accounting, Prentice Hall of India, 2011.
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting, e-book.
4. Vohra N.D., Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd, 2007.
5. Cost management by Dr. J. Made Gowda, Himalaya Publishing House, 2013.

CO-PO MAPPING

Mapping of Course Objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3–Strong, 2–Medium, 1–Weak														
Cos	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	-	2	-	-	2	3	-	3	2	1	-
CO2	2	2	2	-	2	-	-	-	2	-	3	3	-	2
CO3	3	1	3	-	3	1	-	-	-	-	3	3	-	1
CO4	3	2	3	-	3	-	3	-	-	-	3	2	1	2
CO5	3	2	2	-	3	1	2	-	-	-	3	3	1	2



COURSE OBJECTIVES

To enable the students to

- give exposure to various industrial safety equipment's and methods.
- understand tools used for maintenance cost and services life of equipment.
- analyze the types, causes, effects of wear reduction methods.
- enhance awareness of fault tracing concept and maintenance and types of faults in machine tools and their general causes.
- develop rudimentary ability on periodic inspection concept and needs of various mechanical and electrical equipment's.

UNIT I INDUSTRIAL SAFETY**9**

Accident- causes, types, results and control; mechanical and electrical hazards- types, causes and preventive steps/procedure; describe salient points of factories act 1948 for health and safety- wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes; Fire prevention and firefighting equipment and methods.

UNIT II FUNDAMENTALS OF MAINTENANCE ENGINEERING**9**

Definition and aim of maintenance engineering; Primary and secondary functions and responsibility of maintenance department; Types of maintenance; Types and applications of tools used for maintenance; Maintenance cost & its relation with replacement economy; Service life of equipment.

UNIT III WEAR AND CORROSION AND THEIR PREVENTION**9**

Wear- types, causes, effects, wear reduction methods; lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication; Definition, principle and factors affecting the corrosion- Types of corrosion, corrosion prevention methods.

UNIT IV FAULT TRACING**9**

Fault tracing-concept and importance, decision tree concept, need and applications; sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors; Types of faults in machine tools and their general causes.

UNIT V PERIODIC AND PREVENTIVE MAINTENANCE

9

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes; overhauling of mechanical components; overhauling of electrical motor- common troubles and remedies of electric motor, repair complexities and its use; definition, need, steps and advantages of preventive maintenance; Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets; Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance; Repair cycle concept and importance.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, the students will be able to

- differentiate the types of accident causes and preventive steps of industrial safety.
- assess the various types and applications of tools used for maintenance and its relation with economy.
- analyze the factors affect the corrosion and its prevention methods.
- identify the types of faults in machine tools and their general causes.
- analyze the various preventive maintenance of mechanical and electrical equipment's and repair cycle concepts.

REFERENCES

1. Foundation Engineering Handbook, Hans F. Winterkorn, Hsai-yang fang, Chapman & Hall publishers London 2010.
2. Pump-hydraulic Compressors, Audels, Tata MC Graw hill Publication 2003.
3. Industrial Maintenance , H. P. Garg, S. Chand Ltd., 1987.
4. Maintenance Engineering Handbook, Higgins & Morrow, Tata MC Graw hill 1977.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-	-	3	-	3	2	-	-	-	2	-
CO2	3	-	2	3	-	2	-	3	3	-	-	-	2	-
CO3	3	-	2	3	3	3	-	3	-	-	-	-	2	-
CO4	3	-	2	3	-	3	-	3	-	-	-	-	2	-
CO5	3	-	2	3	3	3	-	3	-	3	-	-	2	-



COURSE OBJECTIVES

To enable the students to

- give exposure on composite materials and functional requirements of reinforcement matrix.
- understand the mechanical behavior of composites and its preparation methods.
- understand various manufacturing methods of metal matrix composites.
- develop the different preparation of moulding methods.
- enhance the awareness of laminar failure criteria

UNIT I INTRODUCTION

9

Definition – Classification and characteristics of Composite materials, advantages and application of composites; Functional requirements of reinforcement and matrix; Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT II REINFORCEMENTS

9

Preparation-layup, curing; properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers; Properties and applications of whiskers, particle reinforcements; Mechanical Behavior of composites- Rule of mixtures, Inverse rule of mixtures; Isostrain and Isostress conditions.

UNIT III MANUFACTURING OF METAL MATRIX COMPOSITES

9

Casting – Solid State diffusion technique, Cladding; Hot isostatic pressing- Properties and applications; Manufacturing of Ceramic Matrix Composites- Liquid Metal Infiltration , Liquid phase sintering; Manufacturing of Carbon – Carbon composites- Knitting, Braiding, Weaving, Properties and applications.

UNIT IV MANUFACTURING OF POLYMER MATRIX COMPOSITES

9

Preparation of Moulding compounds and prepregs – hand layup method, autoclave method, filament winding method, compression moulding, reaction injection moulding, properties and applications.

UNIT V STRENGTH

9

Laminar Failure Criteria- strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure; Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TOTAL PERIODS: 45**COURSE OUTCOMES**

At the end of this course, the students will be able to

- apply the effect of reinforcement on overall composite performance.
- assess the mechanical behavior of composites, reinforcement properties and its applications.

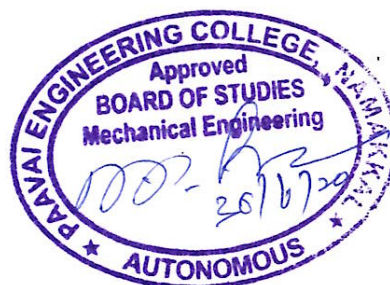
- analyze the properties and applications of different metal matrix composites manufacturing.
- implement various manufacturing methods of polymer matrix composites and its applications.
- identify the various failure appeared in the composite laminate.

REFERENCES

1. Composite Materials Design and Applications – Danial Gay, 3rd edition, CRC press, taylor and francise grove 2014.
2. Composite Materials Science and Applications – Deborah D.L. Chung, 2nd edition, springer 2010.
3. Composite Materials – Science and Engineering K.K.Chawla, 2nd edition, springer, 1998
4. Hand Book of Composite Materials-edited by George Lubin , 1st edition , van Nostrand reinhold company inc 1982.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	1	2	-
CO2	3	2	3	-	-	2	-	-	-	-	-	1	3	-
CO3	3	2	2	-	2	-	-	-	-	-	-	1	3	-
CO4	3	2	2	-	2	-	-	-	-	-	-	1	3	-
CO5	3	2	2	-	-	-	-	-	-	-	-	1	3	-



COURSE OBJECTIVES

To enable the students to

- give exposure on energy from industrial waste.
- understand the manufacture of charcoal and pyrolytic oil and gases.
- develop biomass gasification design, construction and operation.
- enhance the knowledge in fluidized bed combustors and operation of biomass combustors.
- impart the knowledge on biogas plant technology and biomass conversion processes.

UNIT I INTRODUCTION TO ENERGY FROM WASTE 9

Classification of waste as fuel – Agro based, Forest residue, Industrial waste, MSW; Conversion devices – Incinerators, gasifiers, digestors.

UNIT II BIOMASS PYROLYSIS 9

Pyrolysis – Types slow fast; Manufacture of charcoal – Methods, Yields and application; manufacture of pyrolytic oils and gases; yields and applications.

UNIT III BIOMASS GASIFICATION 9

Gasifiers – Fixed bed system ,downdraft and updraft gasifiers; Fluidized bed gasifiers – Design, construction and operation; Gasifier burner arrangement for thermal heating; Gasifier engine arrangement and electrical power; Equilibrium and kinetic consideration in gasifier operation.

UNIT IV BIOMASS 9

Biomass stoves – Improved chullahs, types, some exotic designs; Fixed bed combustors- Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation; Operation of all the above biomass combustors.

UNIT V BIOGAS 9

Properties of biogas (Calorific value and composition); Biogas plant technology and status; Bio energy system - Design and constructional features; Biomass resources and their classification; Biomass conversion processes - Thermo chemical conversion, Direct combustion, biomass gasification, pyrolysis and liquefaction; biochemical conversion - anaerobic digestion, Types of biogas Plants, Applications; Alcohol production from biomass; Bio diesel production; Urban waste to energy conversion; Biomass energy programme in India.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, the students will be able to

- differentiate the types of conversion devices and energy from waste.

- assess the various methods of manufacturing of pyrolytic oils and its applications.
- analyze the different biomass gasifier and factor considered in gasifier operations.
- identify the operations, types and design consideration of fluidized bed combustor.
- analyze the different bio gas plant, application and urban waste energy conversion.

REFERENCES

1. Non Conventional Energy, Ashok V., Desai, New age international, 1990.
2. Biogas Technology - A Practical Hand Book – K.C. Khandelwal, and S.S.Mahdi, Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1989.
3. Food, Feed and Fuel from Biomass, Devinder singh.Chahal, IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, Charles. Y. WereKo-Brobby and Essel. B. Hagan, John Wiley & Sons, Newyork 1996.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
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CO2	-	-	3	3	-	3	3	-	-	-	-	2	3	-
CO3	-	-	3	2	-	3	3	-	-	-	-	2	3	-
CO4	-	-	3	2	-	3	3	-	-	-	-	2	3	-
CO5	-	-	3	2	-	3	3	-	-	-	-	2	3	-

