Percentage of new courses introduced of the total number of courses across all programmes offered during the last five years

Program: Bachelor of Engineering		
Course Title: **Engineering Design Practice [Part B]** **[Part A – Central Level]**		Course Code: **17ECSP202**
L-T-P: **0-0-1.5**	Credits: **1.5**	Contact Hrs: **3 hrs/week**
ISA Marks: **40**	ESA Marks: **0**	Total Marks: **40**
Teaching Hrs: **39 hrs**	Exam Duration: **3 hrs**	

Experiments	Lab assignments/experiment
Phase 1 (Plannig)	Introduction to Eclipse –IDE Requirement modeling : • Identifying use cases and actors • Apply UML notations to draw use case diagram
Phase 2 (Conceptual Design)	Behaviour Modeling using DFD • List behavior of system/sub-system • List states, tasks and their dependencies Illustrate DFD : • Identify data flow and processes of a system • Draw data flow diagrams for system/sub-system • Draw system diagram to show interaction of all domain components (Draw state and sequence diagram for identified tasks)
Phase 3(System Design)	Software Architectures: • List components of architecture • List type of architectures Choose appropriate architecture for given system
Phase 4 (Detail Design)	UI Design using GUI wireframe: • Design function prototyping for event diagrams(DFD) • Identify user interface components • Choose appropriate property of component • Use wireframe to design a user interface

Text books:

1. Ian Somerville, Software Engineering, 9th, Pearson Ed, 2015
2. Clive L Dym and Patrick Little, "Engineering Design: A Project Based Introduction", John Wiley & Sons

Reference books:

1. Roger S. Pressman, Software Engineering: A Practitioners Approach, 7th, McGraw, 2007
2. Shari Lawrence Pfleeger and Joanne M. Atlee, Software Engineering Theory and Practice, 3rd, Pearson Ed, 2006
3. Jalote, P, An Integrated Approach to Software Engineering, 3rd, Narosa Pub, 2005

Program: **Bachelor of Engineering**		
Course Title: **Product Realization**		Course Code: **17ECSP203**
L-T-P: **0-0-2**	Credits: **02**	Contact Hrs: **03 Hrs**
ISA Marks: **80**	ESA Marks: **20**	Total Marks: **100**
Teaching Hrs:	Exam Duration:	

Experiments	Lab assignments/experiment
Week 1 And Week 2	IOT workshop: Introduction to Android studio, Introduction to Arduino programming, PHP
Week 3	Selection of UI and Core Component of Android
Week 4	UI implementation using XML
Week 5	UI implementation and validation
Week 6	Android core component implementation and Unit Testing
Week 7	Android core component implementation and Unit Testing
Week 8	Android core components integration and testing
Week 9	Configuration of IoT Server
Week 10	Integratesubsystems for prototype testing, Analyze the test results, System modification, and System integration.
Week 11	System Testing

Reference:

1. Beginning Android Programming with Android Studio by J.F. DiMarzio

Program: **Bachelor of Engineering**		
Course Title: **Algorithmic Problem Solving**		Course Code: **17ECSE309**
L-T-P: **0-0-6**	Credits: **6**	Contact Hrs: 74
ISA Marks: **70**	ESA Marks: 30	Total Marks: **100**
Teaching Hrs: 74	Exam Duration: 2 to 3 days	

Course Content

Unit – 1	
Chapter 0: Building Blocks Understanding coding platforms and tools, Data Structures and Algorithms revisited	**06 hrs**
Chapter 1: Strategies and Performance Warm up problems, Parsing and Formatting text, Code performance analysis and tools	**06 hrs**
Chapter 2: Advanced Data Structures Matrix, Grids, Trees and variants, Lists, Skip lists, Hash, Trie and variants	**10 hrs**
Chapter 3: Dynamic Programming Memory functions, Optimization problems	**08 hrs**
Unit – 2	
Chapter 4: Graph algorithms Traversal Algorithms, Shortest Path Algorithms, Spanning Tree Algorithms and variants	**25 hrs**
Chapter 5: Introduction to Computational Geometry Points, Line Segments, Polygons and Basics of Geometric Problems	**05 hrs**
Unit – 3	
Chapter 6: Problem Solving Assortment of problems and techniques.	**14 hrs**

Text Book

1. Levitin A., "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2017.
2. Levitin A, Levitin M, "Algorithmic Puzzles", First Edition, Oxford University Press, 2011.
3. Online Coding Platforms

References

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, MIT Press, 2010.

Program: **Bachelor of Engineering**		
Course Title: **Fuzzy Set Theory**		Course Code: **19ECSE402**
L-T-P: **3-0-0**	Credits: 3	Contact Hrs: 3**hrs/week**
ISA Marks: 50	ESA Marks: 50	Total Marks:100
Teaching Hrs: 40	Exam Duration: 3hrs	

Unit –I		
1	**Introduction** : Introduction to Fuzzy Logic, Fuzzy Membership Functions, Operations on Fuzzy Sets	8hrs
2	**Fuzzy Measures:** Fuzzy Relations,Fuzzy Proposition,Fuzzy Implications,Fuzzy Inferences	8hrs
Unit –II		
3	**Fuzzy Relations and Fuzzy Graphs**: Fuzzy Relations, Compositions of Fuzzy Relations, Properties of the Min-Max Composition, DefuzzificatinTechniques,Lambda-cut method, Weighted average method, Maxima methods, Centroid methods, Output of a Fuzzy System	8 hrs
4	**Uncertainty Modeling:** Application-oriented Modeling of Uncertainty, Causes of Uncertainty, Uncertainty Methods, Possibility Theory	8hrs
Unit –III		
5	**Fuzzy Data Bases and Queries:** Introduction, Fuzzy Relational Databases, Fuzzy Queries in Crisp Databases	4 hrs
6	**Fuzzy Sets and Expert Systems:** Introduction to Expert Systems, Uncertainty Modeling in Expert Systems, Applications	4 hrs

Text Books:

1. H. J. Zimmermann ., Fuzzy Set Theory-and Its Applications, Fourth Edition, 4th Ed., Springer Science Business Media, LLC , 2001
2. Chander Mohan, An Introduction to Fuzzy Set Theory and Fuzzy Logic,2nd ed. Vivo Books pvt ltd , 2015

Reference Books:

1. Timothy J. Ross, Fuzzy Logic With Engineering Applications, 3ed., 2010, A John Wiley and Sons, Ltd., Publication
2. Kumar S. Ray,Soft Computing and Its Applications: Fuzzy Reasoning and Fuzzy Control, 1st Edition, Apple Academic Press 2014
3. Ahmed M. Ibrahim, Fuzzy Logic for Embedded Systems Applications, Elesvier Press, 2004.

Scheme for End Semester Assessment (ESA)

UNIT	**8 Questions to be set of 20 Marks Each**	**Chapter Numbers**	**Instructions**
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2	Solve Any **2**
II	Q.No.-4, Q.No.-5, Q.No.-6	3,4	Solve Any **2**
III	Q.No.-7	5	Solve Any **1**
	Q.No.-8	6	

Program: **Bachelor of Engineering**		
Course Title: **Natural Language Processing**		Course Code: **18ECSE403**
L-T-P: **2-0-1**	Credits: **3**	Contact Hrs: **04 hrs/week**
ISA Marks: **50**	ESA Marks: **50**	Total Marks: **100**
Teaching Hrs: **30**	Exam Duration: **3 hrs**	

	Unit –I	
1	**Introduction to NLP and Deep Learning** Introduction to Natural Language Processing, Applications of Natural Language Processing, Word2vec introduction, Word2vec objective function gradients	**05 hrs**
2	**Dependency Parsing, Recurrent Neural Networks** Dependency Grammar , Neural dependency parsing, Recurrent Neural Networks and Language Models, Vanishing Gradients, Fancy RNNs	**07 hrs**
	Unit –II	
3	**Machine Translation, Seq2Seq and Attention** Machine Translation, Seq2Seq and Attention, Advanced Attention	**06 hrs**
4	**Transformer Networks , Coreference Resolution, Memory Networks** Transformer Networks and CNNs, Tree Recursive Neural Networks and Constituency Parsing , Advanced Architectures and Memory Networks	**06 hrs**
	Unit –III	
5	**Reinforcement Learning** Reinforcement Learning for NLP, Semi-supervised Learning for NLP, Future of NLP Models, Multi-task Learning and QA Systems	**06 hrs**

Text Books:

1. Yoav Goldberg. A Primer on Neural Network Models for Natural Language Processing , 2016.

Reference Books:

Dan Jurafsky and James H. Martin. Speech and Language Processing (3rd ed. draft).

Ian Goodfellow, YoshuaBengio, and Aaron Courville. *Deep Learning*. MIT Press.

Scheme for End Semester Assessment(ESA)

UNIT	**8 Questions to be set of 20 Marks Each**	**Chapter Numbers**	**Instructions**
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	4,5	Solve Any **2** out of **3**
III	Q.No.-7	6	Solve Any **1** out of **2**
	Q.No.-8		

Program: **Bachelor of Engineering**		
Course Title: **Advanced Parallel Computing**		Course Code:**18ECSE408**
L-T-P:**3-0-0**	Credits: **3**	Contact Hrs: **03 hrs/week**
CIE Marks**: 50**	SEE Marks: **50**	Total Marks: **100**
Teaching Hrs: **40**	Exam Duration: **3 hrs**	

Unit –I		
1	**Introduction and History** GPUs as Parallel Computers; Architecture of a Modem GPU; Parallel Programming Languages and Models; Overarching Goals; Evolution of Graphics Pipelines; The Era of Fixed- Function ; Graphics Pipelines; Evolution of Programmable Real-Time Graphics; Unified Graphics and Computing Processors; GPGPU; An Intermediate Step; GPU Computing; Scalable GPUs Recent Developments; Future Trends.	**07 hrs**
2	**Introduction to CUDA** Data Parallelism; CUDA Program Structure; A Matrix-Matrix Multiplication Example; Device Memories and Data Transfer; Kernel Functions and Threading; Function declarations; Kernel launch; Predefined variables; Runtime API.CUDA Thread Organization; Using b1ock Id x and thread Id x ; Synchronization and Transparent Scalability; Thread Assignment ; Thread Scheduling and Latency Tolerance.	**09 hrs**
Unit –II		
3	**CUDA Memories** Importance of Memory Access Efficiency; CUDA Device Memory Types; A Strategy for Reducing Global Memory Traffic; Memory as a Limiting Factor to Parallelism; Global Memory Bandwidth; Dynamic Partitioning of SM Resources; Data Perfetching; Instruction Mix; Thread Granularity; Measured Performance.	**07 hrs**
4	**Introduction to OPENCL** Introduction to OPENCL; Background; Data Parallelism Model; Device Architecture; Kernel Functions; Device Management and Kernel Launch; Electrostatic Potential Map in OpenCL.	**09 hrs**
Unit –III		
5.	**Case Study** Concepts of Game Design, Applications like Matrix multiplication, MRI reconstruction Molecular Visualization and Gaming.	**04 hrs**
6.	**Parallel Programming and Computational Thinking** Goals of Parallel Programming, Problem Decomposition, Algorithm Selection, Computational Thinking.	**04 hrs**

Text Books:

1. David B. Kirk, Wen-mei W. Hwu, "Programming Massively Parallel Processors: A Hands on Approach", Morgan Kaufmann/Elsevier India reprint, 2010.

Reference Books:

1. Benedict R Gaster, Lee Howes, David Kaeli, Perhaad Mistry and Dana Schaa, "Heterogeneous Computing with OpenCl", Morgan Kaufmann/Elsevier reprint, 2012.

Scheme for End Semester Assessment(ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	3,4	Solve Any **2** out of **3**
III	Q.No.-7	5	Solve Any **1** out of **2**
	Q.No.-8	6	

Program: Bachelor of Engineering		
Course Title: **Wireless Ad Hoc and Sensor Networks**		Course Code: **18ECSE406**
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **3hrs/week**
CIE Marks: **50**	SEE Marks: **50**	Total Marks: **100**
Teaching Hrs: **40 hrs**	Exam Duration: **3 hrs**	

Unit –I		
1	**Introduction:** Fundamentals of wireless communication technology, Characteristics of wireless channel, Multiple Access Techniques, IEEE802.11 Standards, Bluetooth, Cellular Concept, Cellular Architecture.	**07 hrs**
2	**Ad hoc Networks:** Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless internet.	**04 hrs**
3	**MAC Protocols:** Introduction, Issues in Designing MAC protocol, Design goals, Classification, Contention Based Protocols with Reservation Mechanisms. Contention-Based MAC Protocols with Scheduling Mechanism.	**05 hrs**
Unit –II		
4	**Routing Protocols:** Introduction, Issues in designing a routing protocol, classification, Table drive routing protocol, On-demand routing protocol, Hybrid routing protocol, Hierarchical routing protocols, Power aware routing protocols.	**06 hrs**
5	**Energy Management:** Introduction, Need for Energy Management, Classification, Battery Management Scheme, Transmission Power Management Schemes, System Management Scheme.	**05 hrs**
6	**Sensor Networks:** Introduction, Architecture, Data Dissemination, Data Gathering, MAC Protocols (schedule based protocols).	**05 hrs**
Unit –III		
7	**Routing Protocols for Sensor Networks:** Routing Characteristics, Routing Strategies, LEACH, SPIN.	**04 hrs**
8	**Sensor Network Applications:** Case Study: Traffic Control, Health Care, Green House Monitoring.	**04 hrs**

Text Books:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad hoc Wireless Networks",2nd Edition, Pearson Education, 2006.
2. KazemSohraby, Daniel Minoli, TaiebZnati, "Wireless Sensor Networks: Technology, Protocols, and Applications", John Wiley and Sons, 2007.

Reference Books:

1. Ozan K. Tonguz and Gianguigi Ferrari, "Ad hoc Wireless Networks",John Wiley, 2006.
2. C.K. Toh, "Adhoc Mobile Wireless Networks",Protocols and Systems, Prentice-Hall PTR, 2002.

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2,3	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	4,5,6	Solve Any **2** out of **3**
III	Q.No.-7	7	Solve Any **1** out of **2**
	Q.No.-8	8	

Program: **Bachelor of Engineering**		
Course Title: **Software Architecture and Design Thinking**		Course Code:**18ECSE410**
L-T-P:**3-0-0**	Credits: **3**	Contact Hrs: 3**hrs/week**
CIE Marks**: 50**	SEE Marks: **50**	Total Marks: **100**
Teaching Hrs: **40**	Exam Duration: **3 hrs**	

Unit –I		
1	**Chapter No. 1 What Is Software Architecture?** What Software Architecture Is and What It Isn't ,Architectural Structures and Views, Architectural Patterns, What Makes a "Good" Architecture?	**5 hrs**
2	**Chapter No. 2 Why Is Software Architecture Important?** Inhibiting or Enabling a System's Quality Attributes, Reasoning About and Managing Change, Predicting System Qualities, Enhancing Communication among Stakeholders, Carrying Early Design Decisions, Defining Constraints on an Implementation, Influencing the Organizational Structure, Enabling Evolutionary Prototyping, Improving Cost and Schedule Estimates, Supplying a Transferable, Reusable Model, Allowing Incorporation of Independently Developed Components, Restricting the Vocabulary of Design Alternatives, Providing a Basis for Training	**6hrs**
3	**Chapter No. 3 The Many Contexts of Software Architecture** Architecture in a Technical Context, Architecture in a Project Life-Cycle Context, Architecture in a Business Context, Architecture in a Professional Context, Stakeholders, How Is Architecture Influenced?,What Do Architectures Influence?	**5 hrs**
Unit –II		
4	**Chapter No. 4. Understanding Quality Attributes** Architecture and Requirements, Functionality, Quality Attribute Considerations, Specifying Quality Attribute Requirements, Achieving Quality Attributes through Tactics, Guiding Quality Design Decisions	**5 hrs**
5	**Chapter No. 5. Quality Attributes** Tactics for Availability, Tactics for Interoperability, Tactics for Modifiability,	**6hrs**

	Tactics for Performance, Tactics for Security, Tactics for Testability, Tactics for Usability,	
6	**Chapter No. 6. Architectural Tactics and Patterns** Architectural Patterns, Overview of the Patterns Catalog, Relationships between Tactics and Patterns, Using Tactics Together	**5 hrs**
Unit –III		
5.	**Chapter No. 7 Architecture and Requirements** Gathering ASRs from Requirements Documents, Gathering ASRs by Interviewing Stakeholders, Gathering ASRs by Understanding the Business Goals, Capturing ASRs in a Utility Tree, Tying the Methods Together	**4 hrs**
6.	**Chapter No. 8 Designing an Architecture, Implementation, Testing and EvaluationDesigning:** Design Strategy, The Attribute-Driven Design Method, The Steps of ADD, Implementation, and Testing:Architecture and Implementation, Architecture and Testing, Evaluation:Evaluation Factors, The Architecture Tradeoff Analysis Method, Lightweight Architecture Evaluation	**4 hrs**
Text Books: 1. Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice (3rd Edition), Addison-Wesley Professional; 3 edition		
Reference Books:		

Scheme for End Semester Assessment(ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	3,4	Solve Any **2** out of **3**
III	Q.No.-7	5	Solve Any **1** out of **2**
	Q.No.-8	6	

Program: **Bachelor of Engineering**		
Course Title: **Embedded Intelligent Systems**		Course Code: **18ECSE302**
L-T-P: 0-0-3	Credits: 3	Contact Hrs: **6hrs/week**
ISA Marks: 80	ESA Marks: 20	Total Marks: 100
Teaching Hrs: 60	Exam Duration: 3 hrs	

1	**Basics of embedded systems** Linux Application Programming, System V IPC, . Linux Kernel Internals and Architecture , Kernel Core , Linux Device Driver Programming, Interrupts & Timers , Sample shell script, application program, driver source build and execute	**10 hrs**
2	**Heterogeneous computing** Basics of heterogeneous computing with various hardware architectures designed for specific type of tasks, Advanced heterogeneous computing with a. Introduction to Parallel programming b.GPU programming (OpenCL) c. Open standards for heterogeneous computing (Openvx) , Basic OpenCL examples - Coding, compilation and execution	**12 hrs**
3	**ML Frameworks lab with the target device** Caffe, tensorflow, TF Lite machine learning frameworks & architecture ,Model parsing, feature support and flexibility ,Supported layers , advantages and disadvantages with each of these frameworks, Android NN architecture overview , Full stack compilation and execution on embedded device	**16 hrs**
4	**Model Development and Optimization** Significance of on device AI ,Quantization , pruning, weight sharing, Distillation ,Various pre-trained networks and design considerations to choose a particular pre-trained model ,Federated Learning , Flexible Inferencing	**8 hrs**
6	**Android Anatomy** Android Architecture ,Linux Kernel , Binder , HAL Native Libraries , Android Runtime, Dalvik Application framework , Applications, IPC	**8 hrs**

Course Title: **Model Thinking**	Course Code: **18ECSE411**	
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **30**
CIA Marks: **50**	SEE Marks: 50	Total Marks: **100**
Teaching Hrs: **40**		Exam Duration: **3 hrs**

Content	40 Hrs
Unit – 1	
1. **Why Model** Model Thinking - The need, Advantages and disadvantages, Segregation/Peer Effects, Case study	4 hrs
2.**Modeling People, Tipping Points & Economic Growth** Rational models, Behavioral models, Rule based models, Percolation Models, Growth and its kinds	6 hrs
3. **Special Topics** Standing ovation model, Game of Life, Lyapunov Functions: Equilibrium, A cycle, Randomness or complexity, Coordination and culture. Urn models, Polya process, paths and networks, Prisoners' Dilemma, Collective Action & Mechanism Design	6 hrs
Unit – 2	
4. **Randomness and Learning Models** Luck as randomness, Random Walks & Colonel Blotto, Replicator Dynamics, Fisher's fundamental theorem, Prediction and the Many Model Thinker	8 hrs
5**. Model Checking and Modelling Concurrent Systems** Model Checking, Characteristics of Model Checking, Transition Systems, Parallelism and Communication, The State Space Explosion	8 hrs
Unit – 3	
6**. Linear-Time Properties** Linear-Time behavior, Safety Properties and Invariants, Liveness Properties, Fairness	4 hrs
7. **Regular Properties** Automata on Finite Words, Model-Checking Regular Safety Properties, Automata on Infinite Words, Model Checking with omega-regular properties	4 hrs

Text Books

1. Scott E Page, The Model Thinker, Basic Books Publication, 2018
2. ChristelBaier and Joost-Pieter Katoen, Principles of Model Checking (Representation and Mind Series), The MIT Press, 2008

References

1. Model Thinking Coursera online course from Michigan University.

Program: **Bachelor of Engineering**		
Course Title **Scripting Languages Lab**		Course Code: **18ECSP201**
L-T-P: **0-0-2**	Credits: **2**	Contact Hrs: **4hrs/week**
ISA Marks: **80**	ESA Marks: **20**	Total Marks: **100**
Teaching Hrs: **30**	Exam Duration: **3 hrs**	

1	**Introduction to UNIX Utilities** Architecture, Commands, File Attributes, vi Editor, Process, Simple Filter, File System, Handling Files and Basic File Attributes.	**06hrs**
2	**UNIX shell Scripting** Shell Basics, Shell Environment, Shell Script Programming Concepts, Decision Structures, Looping Structures, and Command line arguments, Functions and Arrays, Regular Expression & Filters, Processes.	**06hrs**
3	**Python Scripting** Python: Types, Variables, and Simple I/O, Branching and Looping, String Manipulation,Numbers, Lists and Dictionaries, Regular Expressions, Functions, Files and Exceptions, Programming using numpy and scipy libraries.	**12hrs**
4	**System Administration** Common administrative tasks, creating and mounting file system, File system management, managing users and group accounts, monitoring system performance, accessing system information, backup and restore files, reconfiguration hardware with kudzu, installing and removing packages.	**06 hrs**

Tentative plan of lab implementation

Expt./ Job No.	Lab assignments/experiment	No. of Lab. Slots per batch (estimate)
1-2	Introduction to UNIX Utilities	02
3-4	Shell Script	03
5-10	Python programming	05
11-12	System Administration	02

Text Books

1. Sumitabha Das, UNIX Concepts and Applications", 4th Edition, McGraw-Hill, 2017.
2. Mark Lutz, "Programming Python", 4th Edition, O'Reilly, 2010.

Reference Books

1. Noah Gift, Jeremy Jones, Python for Unix and Linux System Administration, 2008.
2. RytisSileikam, Pro Python System Administration, 2nd Edition, 2014
3. Michael Dawson, Python Programing for the Absolute Beginner, Premier Press, 3rd Edition 2010.

Program: Bachelor of Engineering		
Course Title: Object Oriented Programming with C++		Course Code: 18ECSC207
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **3 hrs/week**
ISA Marks: **50**	ESA Marks: **50**	Total Marks: **100**
Teaching Hrs: **40**	Exam Duration: **3hrs**	

Unit –I		
1	**Chapter No. 1: Introduction:** Introduction to object oriented programming. Characteristics of object oriented languages, Programming Basics, arrays, Functions in C++ (parameter passing techniques.)	**4 hrs**
2	**Chapter No. 2:Classes and Objects:** Introduction to Classes and Objects, encapsulation visibility modifiers, constructor and its types, nested classes, String class. UML diagrams to describe classes and relationships.	**6 hrs**
3	**Chapter No. 3:Inheritance:** Introduction, types of Inheritance, constructors, Abstract class,Aggregation: classes within classes	**6 hrs**
Unit –II		
4	**Chapter No. 4:Virtual Functions and Polymorphism:** Virtual functions, Friend functions, static functions, The 'this' pointer	**6 hrs**
5	**Chapter No. 5:Templates and Exception Handling:** Function and class templates.Introduction to exceptions, Throwing an Exception, Try Block, Exception Handler (Catching an Exception), Multiple exceptions. Exceptions with arguments	**6hrs**
6	**Chapter No. 6:Design Patterns:** Creational, Structural and Behavioural design patterns.	**4 hrs**
Unit –III		
7	**Chapter No. 7:Streams and Files:** Stream classes, File I/O with streams.	**4 hrs**
8	**Chapter No. 8:Standard Template Library:** container classes**:** Sequence and Associative Containers	**4 hrs**

Textbooks

1. Robert Lafore, "Object oriented programming in C++", 4th Edition, Pearson education,

Reference Books

1. Lippman S B, Lajorie J, Moo B E, C++ Primer, 5ed, Addison Wesley, 2013.
2. Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill

Course Code: 18ECSC206	Course Title: Microcontroller Programming& Interfacing	
L-T-P-SS: 3-0-1	Credits: 4	Contact Hrs: 3+2 hrs
ISA Marks: 50	ESA Marks: 50	Total Marks: 100
Teaching Hrs: 40		Exam Duration: 3 hrs

Content	Hrs
Unit – I	
Chapter No. 1.The 8051 Architecture Introduction, 8051 Microcontroller hardware, input/output pins, ports & circuits, External memory,	04 hrs
Chapter No. 2. Assembly Programming Introduction, addressing modes, External Data Moves, Code Memory Read Only Data Moves / Indexed Addressing mode, PUSH and POP opcodes, Data exchanges, assembler directives, example programs. Byte level logical Operations, Bit level Logical Operations, Rotate and Swap Operations, Example Programs. Arithmetic Operations: Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, Example Programs. The JUMP and CALL Program range, Jumps, Call and Subroutines, Example programs	12hrs +08 hrs (Lab)
Unit – II	
Chapter No. 3. Timer/Counter & Serial Port Programming. C Data Types and Time delay computation in 8051 Counters and Timers, Programming 8051 Timers/counters in different modes, Basics of Serial Communication, RS232 standards, 8051 connection to RS232, 8051 serial port Programming.	12 hrs
Chapter No. 4. Interrupts Programming 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the Serial Communication Interrupts, Interrupt Priority in the 8051, Interrupt programming.	04 hrs
	4 hrs
Unit – III	
Chapter No. 5. Interfacing to Peripheral Devices Interfacing 8051 to LEDs, DIP switches, BCD Decoder display, 7 Segment Display, LCD, Keypad, DAC, ADC, Stepper Motor and DC Motor	08hrs +12 Hrs (Lab)

Text Books (List of books as mentioned in the approved syllabus)

2. Ayala.K.J, "The 8051 Microcontroller", 3rd.,CENGAGELearning, 2007.
3. Mazidi.M.A, Mazidi.J.G and McKinlay.R.D, "The 8051 Microcontroller and Embedded Systems-using Assembly and C", 2ed, PHI 2006/Pearson, 2006.

References

1. Ayala.K.J., Gadre D.V., "The 8051 Microcontroller & Embedded Systems using Assembly and C", 1ed., CENGAGE Learning, 2010
2. V. Udayashankara, M.S. Mallikarajunaswamy, "8051 Microcontroller Hardware, Software and Applications", 1ed., Tata McGraw Hill, 2009.

Scheme for End Semester Assessment (ESA)

UNIT	**8 Questions to be set of 20 Marks Each**	**Chapter Numbers**	**Instructions**
I	Q.No.-1, Q.No.-2, Q.No.-3	1 & 2	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	3 &4	Solve Any **2** out of **3**
III	Q.No.-7	5	Solve Any **1** out of **2**
	Q.No.-8	5	

Program: Bachelor of Engineering		
Course Title: **Object** Oriented **Programming with C++ Lab**		Course Code: **18ECSP203**
L-T-P: **0-0-1.5**	Credits: **1.5**	Contact Hrs: **3 hrs/week**
ISA Marks: **80**	ESA Marks: **20**	Total Marks: **100**
Teaching Hrs: **39**	Exam Duration: **3hrs**	

Experiments	**Lab assignments/experiment**
2-Demonstration	Introduction to Code Blocks IDE (Integrated Development Environment), C++ programming basics.
4–Exercise	Classes and objects, Inheritance, Polymorphism, Templates and Exceptions Handling
2-Structured Enquiry	Classes and objects, Inheritance, Polymorphism, Templates and Exceptions Handling
1-Open Ended	Data types, Classes and Objects, Inheritance polymorphism, Exception Handling. Design patterns

Text Book:

1. Robert Lafore, "Object oriented programming in C++", 4th Edition, Pearson education.

Reference Books:

1. Lippman S B, Lajorie J, Moo B E, C++ Primer, 5ed, Addison Wesley, 2013.
2. Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill
1.

Evaluation :

Students Assessment Through CIE (80%) + SEE (20%)

	Assessment	**Weightage in Marks**
Continuous Internal Evaluation (80%)	Exercises	40
	Structured Enquiry	20
	Open Ended Experiment	20
Semester End Examination (20%)	Structured Enquiry	**20**
	Total	**100**

Program: Bachelor of Engineering			
Course Title: **JAVA Programming**		Course Code: 19ECSP301	
L-T-P:**1-0-1.5**	Credits: **2.5**	Contact Hrs: 4 Hrs/week	
ISA Marks: **80**	ESA Marks: **20**	Total Marks: **100**	
Teaching Hrs: **52**	Exam Duration: **3hrs**		
Unit –I			
1	**JAVA Language Fundamentals:** Java Features, Programming basics, Arrays and Strings, classes and objects		**4 Hrs**
2	**Inheritance**: Introduction, types of inheritance, static and dynamic polymorphism.		**2 Hrs**
Unit –II			
3	**Interfaces and Exception Handling:** Introduction,Create and implement interfaces, Exception handling,		**2 Hrs**
4	**Generics and Collections Frame work:** Introduction to generic programming, Collections: Interfaces: List, Set, Queue Classes: ArrayList, LinkedList and HashSet, Map		**2 Hrs**
Unit –III			
5	**Lambda Expressions:** Functional programming, Functional interface, Bulk operations on collections		**2hrs**
6	**Java Database Connectivity (JDBC):** Introduction, Drivers, Interfaces and classes to develop data base applications, case study		**2 Hrs**

Text Books:

1. JAVA The Complete Reference, Herbert Schildt, 10th Ed, 2017, McGraw-Hill

Reference Book

1. Kathy Sierra and Bert Bates, Head First Java: A Brain-Friendly Guide, 2nd Edition, O'Reilly Media
2. Introduction to Java Programming, Liang Y D, Pearson, 11th Edition

Program: **Bachelor of Engineering**		
Course Title: **Semantic Web**		Course Code:**19ECSE303**
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **3hrs/week**
ISA Marks: **50**	ESA Marks: **50**	Total Marks: **100**
Teaching Hrs: **40**	Exam Duration: **03 hrs**	

Unit –I		
1	**Introduction to Semantics** History of the Web, Limitations, Vision of Semantic Web, Principles, Data Integration Across Web, Data Modeling Methods, Semantic Relationships, Metadata, Perpetual Data	**4 hrs**
2	**Expressing Meaning** Triple Store, Merging Graphs, Querying: Case Study	**4 hrs**
3	**Using Semantic Data** Query Language, Feed Forward Inference, Searching for Connections, Linked Data, Freebase	**8 hrs**
Unit –II		
4	**Working with Semantics** RDF—The Basis of the Semantic Web, OWL, Metadata with RDF, Metadata Taxonomies, Ontology	**8 hrs**
5	**Reasoning and Social Web** Reasoning types: Approximate Reasoning and Bounded Reasoning, Social Semantic Web, Semantic Crawlers	**8 hrs**
Unit –III		
6	**Semantic Modeling** Semantic Modeling, Semantic Web Applications, Logic for Semantic Web, Case Studies: Dr. Watson, Yahoo! SearchMonkey	**8 hrs**

Text Books

1. Grigoris Antoniou, Paul Groth, Frank van Harmelen and Rinke Hoekstra, A Semantic Web Primer, MIT Press; 3rd edition, 2012.
2. Toby Segaran, Colin Evans, and Jamie Taylor, Programming the Semantic Web: Build Flexible Applications with Graph Data, O'Reilly Media; 2 edition, July 2009.

Reference Books:

1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies, Chapman and Hall; 1st edition, 2009.
2. Dean Allemang, and James Hendler, Semantic Web for the Working Ontologist, Effective Modeling in RDFS and OWL, Morgan Kaufmann; 2nd edition, 2011.
3. John Hebeler, Matthew Fisher, Ryan Blace, Andrew Perez-Lopez, and Mike Dean (Foreword), Semantic Web Programming, Wiley Publishers, 1 edition 2009.

Scheme for End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions

I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2,3	Solve Any **2**
II	Q.No.-4, Q.No.-5, Q.No.-6	4,5	Solve Any **2**
III	Q.No.-7	6	Solve Any **1**
	Q.No.-8	6	

Course Title: Block Chain Technology		Course ode:19ECSE301
L-T-P: **2-0-1**	Credits: **3**	Contact Hrs: **3hrs/week**
ISA Marks: **50**	ESA Marks: **50**	Total Marks: **100**
Teaching Hrs: **40**	Exam Duration: **3 hrs**	

	Unit –I	
1	**Introduction** Overview of Blockchain, History: Digital Money to Distributed Ledgers, Design Primitives: Protocols, Security, Consensus, Permissions, Privacy	**08 hrs**
2	**Blockchain Architecture and Design** Crypto primitives- Hash, Signature, Hashchain to Blockchain, basic consensus mechanisms, Requirements for the consensus protocols, Proof of Work, Proof of State, Scalability issues of consensus protocols	**08 hrs**
	Unit –II	
3	**Blockchain Contracts** Financial Services, Crowdfunding, Bitcoin Prediction Markets, Smart Property, Smart Contracts, Blockchain Development Platforms and APIs, Blockchain Ecosystem: Decentralized Storage, Communication, and Computation	**08 hrs**
4	**Etherium** Etherium transactions, accounts, smart contracts, smart contract development, Solidity basics, basic contracts, distributed storage, Etherium scaling	**08 hrs**
	Unit –III	
5	**Blockchain Applications** Blockchain in Financial Software and Systems: Settlements, KYC, InsuranceBlockchain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution system social welfare systems	**08hrs**

Text Books:

1. Melanie Swan, "Blockchain: Blueprint for New Economy", 1st Edition, O'Reilly Media, 2014.

Reference Books:

1**.** ArshdeepBhaga, Vijay Madisetti, "Blockchain Applications: A Hands-On Approach", Paperback– January 31, 2017

Scheme for End Semester Assessment (ESA)

UNIT	**8 Questions to be set of 20 Marks Each**	**Chapter Numbers**	**Instructions**

I	Q.No.-1, Q.No.-2, Q.No.-3	1,2	Solve Any **2**
II	Q.No.-4, Q.No.-5, Q.No.-6	3,4	Solve Any **2**
III	Q.No.-7, 8	5	Solve Any **1**

Course Title: The ARM Architecture		**Coursecode:19ECSE302**
L-T-P: 2-1-0	**Credits: 3**	**Contact Hrs: 3hrs/week**
ISA Marks: 50	**ESA Marks: 50**	**Total Marks: 100**
Teaching Hrs: 30	**Exam Duration: 3 hrs**	

	Unit –I	
1	**ARM Embedded Systems and Processor Fundamentals** The RISC Design Philosophy , The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extensions, Architecture Revisions, ARM Processor Families	06 hrs
2	**Introduction to the ARM Instruction Set & Assembly Programming** Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions, Loading Constants, ARMv5E Extensions, Conditional Execution, Thumb instruction set.	06 hrs
	Unit –II	
3	**Efficient C Programming** Overview of C Compilers and Optimization, Basic C Data Types, C Looping Structures, Register Allocation, Function Calls, Pointer Aliasing, Structure Arrangement, Bit-fields, Unaligned Data and Endianness, Division.	06 hrs
4	**Writing and Optimizing ARM Assembly Code** Writing Assembly Code, Profiling and Cycle Counting, Instruction Scheduling, Register Allocation, Conditional Execution, Looping Constructs, Bit Manipulation, Efficient Switches, Handling Unaligned Data.	06 hrs
	Unit –III	
5	**Introduction to LPC-2148 controller** Input output Ports, Pin select registers, Input output select registers, direction control and control registers, Introduction to interfacing standards	03 hrs
6	**ARM Interfacing** ARM interfacing to peripherals like LED, LCD, Seven segments, Motors, Converters, Keypad.	03 hrs

Text Books

1. Andrew N.Sloss et al, ARM System Developer's Guide- Designing and Optimizing System Software

Reference Books:

1. Marilyn Wolf, Computers as Components: Principles of embedded computing system design, Morgan Ka, 2012
2. Steve Furber, ARM System-on-chip Architecture, 2, Pearson, 2000

Tutorial Plan

Expt./ Job No.	assignments/experiment	No. of Lab. Slots per batch (estimate)
1	ALP on arithmetic instructions set	*01*
2	ALP on logical instructions set	01
3	ALP on loop and branch instructions	01
4	Interface LED and Seven segments to ARM for displaying message.	01
5	Interface LCD to ARM for displaying message.	01
6	Interface Keypad to read the characters	01
7	Rotate DC and stepper motor for variable speed and direction	01
8	Interface DAC to ARM controller	01

Scheme for End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1,2	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	3,4	Solve Any **2** out of **3**
III	Q.No.-7, 8	5	Solve Any **1** out of **2**