Honours Courses

Department : **Computer Science and Engineering**		Programme: **B.Tech. (CS)-Honours**						
Semester : **Third**		Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CSH01	**Human Computer Interaction**	3	1	-	4	40	60	100
Prerequisite	**Nil**							
Course Outcome	**CO1**	Ability to assimilate physiological and psychological factors of human and infer requirements of human computer interaction						
	CO2	Decompose a complex interactive system into simpler components, using appropriate design patterns and following interactive design standards						
	CO3	Analyse and choose an appropriate model for user interface design and develop prototypes to suit user behaviour with consideration of cognitive, psychological factors						
	CO4	Evaluate user interfaces and detect usability problems by doing usability studies (observations) with human subjects						
	CO5	Apply the human interaction concepts to design web interfaces and evaluate through evaluation metrics						

UNIT-I	**HCI – Basic Concepts**	**Periods: 12**
Human -Introduction-Input–Output Channels- Human Memory- Thinking: Reasoning and Problem Solving – Computer- The Computer- Introduction - Text Entry Devices -Design Focus-Display Devices- Devices for Virtual Reality and 3D Interaction- Physical Controls, Sensors and Special Devices- Smart-its – Making Using Sensors Easy- Printing and Scanning Design Focus: Readability of Text – Memory- Processing and Networks – Models of Interaction Video Recorder - Frameworks and HCI- Ergonomics-: Industrial Interfaces- Interaction Styles- Navigation In 3D and 2D- Elements of The WIMP Interface- Learning Toolbars- Interactivity- The Context of the Interaction-Paradigms for Interaction.		**CO1**
UNIT-II	**Interactive System Design Practices**	**Periods: 12**
Interaction Design Basics-Navigation Design-Screen Design And Layout-Iteration and Prototyping – HCI in the Software Process -Software Design Cycle-Usability Engineering-Iterative Design and Prototyping – Design Rules-Principles to Support Usability-Standards-Guidelines-HCI Patterns Implementation Support- Evaluation Techniques-Universal Design-User Support.		**CO2** **CO3**
UNIT-III	**Models for Interface Design Process**	**Periods: 12**
Cognitive Models – Socio-Organizational Issues and Stake Holder Requirements –Communication and Collaboration Models- Dialog Notations and Design-Modelling Rich Interaction.		**CO3**
UNIT-IV	**User Experience (UX) Evaluation**	**Periods: 12**
UX-Evaluation-Introduction-Formative-Summative Evaluation Methods-Types of Evaluation Data-Rapid Evaluation Methods –Design Walkthroughs and Reviews-UX Inspection-Quasi Empirical UX Evaluation-Evaluation Reporting.		**CO4**
UNIT-V	**Web Interfaces and Case Studies**	**Periods: 12**
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays Inlays, Virtual Pages, and Process Flow- Case Studies.		**CO2** **CO3** **CO4** **CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**	**Total Periods: 60**

Reference Books

1. Alan Dix, Janet Finlay, Gregory Abowd and Russell Beale, Human Computer Interaction, Third Edition, Pearson Education, 2004.
2. Bill Scott and Theresa Neil, Designing Web Interfaces, First Edition, O`Reilly, 2009.
3. Rex Hartson and Pardha S Morgan Kaufmann, The UX Book: Process and Guidelines for Ensuring a Quality User Experience, Kindle Edition, 2012.
4. Ben Shneiderman, Catherine Plaisant Maxine Cohen, Steven Jacobs, Niklas Elmqvist and Nicholas Diakopoulos, Designing the User Interface: Strategies for Effective Human-Computer Interaction, Sixth Edition, Pearson, 2017.

Department : **Computer Science and Engineering**		Programme: **B.Tech. (CS)-Honours**						
Semester : **Fourth**		Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CSH02	**Advanced Data Structure and Algorithms**	3	1	-	4	40	60	100
Prerequisite	**Nil**							
Course Outcome	**CO1**	Ability to analyze and determine the algorithms and its correctness and learn the advanced heap structures						
	CO2	Mastering the different tree data structures and their implementations						
	CO3	Learning and practicing various geometric structures						
	CO4	Knowledge of polygon structuring and linear programming models						
	CO5	Studying the query processing methodologies and positioning						
UNIT-I	**Algorithm Analysis and study of Heap Structures**				**Periods: 12**			
Analysis of recurrent and non-resurrect equations – Time and Space Complexity analysis – features of NP hard and NP Complete algorithms –Single and double ended priority queue – Liftist Trees – Binomial Heaps – Fibonacci Heaps –Pairing Heaps – Symmetric Min-Max Heaps – Interval Heaps.								**CO1**
UNIT-II	**Advanced Tree Structures**				**Periods: 12**			
Efficient Binary Search trees – Optimal binary search trees - AVL Trees – Red Black Trees –Splay Trees. Multiway search trees – m-way search trees - B Trees – B^+trees.								**CO2**
UNIT-III	**Geometric Structuring**				**Periods: 12**			
Introduction - Convex Hulls, Degeneracies and Robustness, Application Domains - Line Segment Intersection - The Doubly-Connected Edge List, Computing the Overlay of Two Subdivisions, Boolean Operations.								**CO3**
UNIT-IV	**Polygon Structures and Linear Programming Models**				**Periods: 12**			
Polygon Triangulation - Guarding and Triangulations, Partitioning a Polygon into Monotone Pieces, Triangulating a Monotone Polygon - Linear Programming- The Geometry of Casting – various linear programming models.								**CO4**
UNIT-V	**Database Querying and Path Planning**				**Periods: 12**			
Orthogonal Range Searching- querying the databases - point location – knowing the point location. Voronoi Diagrams – computations in Voronoi diagram - Robot Motion Planning.								**CO5**
Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**			**Total Periods: 60**			

Reference Books

1. G. Brassard and P.Bratley, Algorithmics: Theory and Practice, Prentice Hall of India, 2010.
2. E.Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++, Second Edition, Universities Press, 2007.
3. Mark de Berg, Otfried Cheong, Marc Van Kreveld and Mark Overmars, Computational Geometry Algorithms and Applications, Third Edition, Springer-Verlang, 2008.
4. S.Sahni, Data Structures, Algorithms and Applications in C++, Second Edition, Universities Press, 2005.

Department : **Computer Science and Engineering**			Programme: **B.Tech. (CS)-Honours**						
Semester :**Fifth**			Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
CSH03	**Advanced Software Design**		3	1	-	4	40	60	100
Prerequisite	**Nil**								
Course Outcome	**CO1**	Identify design goals; Design and Refine subsystem to address the design goals							
	CO2	Understand and Apply the Architectural Styles to System Design							
	CO3	Describe, design and analyze different architectural solutions							
	CO4	Understand and Apply the Architectural Patterns of System Design							
	CO5	Evaluate different design alternatives qualitatively and quantitatively							
UNIT-I	**Decomposing the System**					**Periods: 12**			
Software Design Thinking – Decomposing the system – A Floor Plan example – Specification of User and Developer attributes – Non-Functional requirements – Specification of quality attributes — Addressing Analysis Goals – Case Study – Arena (Game Playing Environment).									**CO1**
UNIT-II	**System Design Concepts**					**Periods: 12**			
Layers and Partitions – Architectural Styles – Pipe and Filter – Client/Server – Three Tier – Four Tier – Model/View/Controller – Repository – Main Program/Subroutine with Shared Data – Abstract Data Type – Implicit Invocation.									**CO2**
UNIT-III	**Design and Description of Architectural Solutions**					**Periods: 12**			
Keyword Frequency Vector (KFV) Case Study – Design solutions using various Architectural Styles – Analysis and Comparison – Description of Software Architectures – Visual notation – Description of Client server structure – Robot Soccer UNSW - Information System.									**CO3**
UNIT-IV	**Reusing Pattern Solutions**					**Periods: 12**			
Selecting Design Patterns and Components – Elements of Design Patterns – Abstract Factory Pattern – Command Design Pattern – Observer Design Pattern – Application of Patterns to Arena Case Study and Stock Monitoring System Case Study.									**CO4**
UNIT-V	**Software Design Evaluation**					**Periods: 12**			
SAAM Method -Process – Analyzing designs of Keyword Frequency Vector (KFV) Case Study – ATAM – Analysis Process – Analysis Activities – Weighted Sum Approach of Multi attribute decision making using Stock Monitoring system Case Study- Analytic Hierarchy Process priority calculation for design alternatives.									**CO5**
Lecture Periods: 45	**Tutorial Periods: 15**		**Practical Periods: -**				**Total Periods: 60**		

Reference Books

1. Hong Zhu, Software Design Methodology: From Principles to Architectural Styles, Butterworth-Heinemann, 2005.
2. Bernd Bruegge and Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Third Edition, Pearson, 2013.
3. G. Zayaraz, Quantitative Approaches for evaluating Software Architectures: Frameworks and Models", VDM Verlag, 2010.

Department : **Computer Science and Engineering**		Programme: **B.Tech. (CS)-Honours**						
Semester : **Sixth**		Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CSH04	**Advanced Security Concepts**	3	1	-	4	40	60	100
Prerequisite	**Nil**							
Course Outcome	**CO1**	Familiar with the security concepts and their threats and vulnerabilities						
	CO2	Analyze the symmetric and asymmetric cryptosystems and their importance in the real time scenarios						
	CO3	Diverse knowledge on the importance of data security and methods to provide integrity						
	CO4	Apply and secure the integrity of data and security practices						
	CO5	Understand the practical real world problems						
UNIT-I	**Concepts on Network, Computer and Web Security**				**Periods: 12**			
Overview of Computer Security - OSI Security Architecture – Security Attacks – Security Mechanism – Fundamental design Principles – Attack surfaces and trees – Model for Network Security. Web Security in Nutshell – Web Security Problems – Credit Cards, Encryption and the Web.								**CO1**
UNIT-II	**Symmetric and Asymmetric Ciphers**				**Periods: 12**			
Symmetric: Classical Encryption techniques – Block Ciphers – Data Encryption Standard – Finite Fields – Advanced Encryption Standards – Pseudo Random Sequence Generators. Asymmetric Ciphers: Principles of Public Key cryptosystem –RSA – Diffie-Hellman Key Exchange – Elliptic Curve Cryptography.								**CO2**
UNIT-III	**Authentication and Data Integrity**				**Periods: 12**			
Hash Functions – Hash Functions Based on Cipher Block Chaining – SHA – Requirement for of Message Authentication – Security of MAC – MAC Based on hash Functions – MAC Based on Block Ciphers – Digital Signatures – Elgamal Digital Signature – NIST Digital Signature – Elliptic Curve Digital Signature – Gost Digital Signature – Cellular Automata**.**								**CO3**
UNIT-IV	**Network and Internet Security**				**Periods: 12**			
Network Access Control – IEEE 802.1X Port Based Network Access Control – Cloud Computing: Risk and Control Measure –Data Protecting in the cloud. Web Server Security: Host and Site Security – Controlling Access to your Web – Secure CGI /API Programming. Wireless Security: Mobile device Security – IEEE 80211i Wireless LAN Security. E-mail Security: S/MIME – PGP – DNSSEC.								**CO4**
UNIT-V	**The Real World Implementation**				**Periods: 12**			
IBM Secret Key Management Protocol –MITRENET –SESAME – IBM Common Cryptographic Architecture – ISO Authentication Frame work – Universal Electronic payment System – AT & ampT Model 3600 Telephonic Security Device (TSD) – Internet Based payment System – evaluation of Credit Card Payment System. National Security Agencies – National Computer Security Center- ISO /IEC 999.								**CO5**
Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**			**Total Periods: 60**			

Reference Books

1. William Stallings, Cryptography and Network Security Principles and Practices, Seventh Edition, Pearson Publication, 2017.
2. Bruce Schneier, Applied Cryptography: Protocols, Algorithms and Source Code, John Wiley & Sons, Inc., 2015.
3. Simson Garfinkel & Eugene H. Spafford, Web Security and Commerce, O'REILLY Publications, 2001.
4. Charles PPfleeger, Security in Computing, Fifth Edition, Prentice-Hall International, 2015.

Department : **Computer Science and Engineering**			Programme: **B.Tech. (CS)-Honours**						
Semester : **Seventh**			Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
CSH05	**Deep Learning**		3	1	-	4	40	60	100
Prerequisite	**Nil**								
Course Outcome	**CO1**	Acquire an insight into the basics of artificial neural networks							
	CO2	Identify the operation of various deep learning architectures							
	CO3	Learn the various platforms and software libraries for implementing deep learning architectures							
	CO4	Examine the applications of the deep learning models to solve real world problems							
	CO5	Formulate solutions to problems that are suitable to apply deep learning strategies and models							
UNIT-I	**Introduction to Artificial Neural Networks**					**Periods: 12**			
Basic Concepts – Model of Artificial Neuron – Activation Functions - Neural Network Architectures – Characteristics – Learning Methods – Perceptron – Multilayer Network – Training Neural Networks - Back Propagation Learning Algorithm- Tuning Parameters.									**CO1**
UNIT-II	**Introduction to Deep Learning**					**Periods: 12**			
Fundamentals of Deep Networks - Common Architectural Principles: Parameters, Layers, Activation Functions, Loss Functions, Optimization Algorithms, Hyper Parameters – Building Blocks of Deep Networks.									**CO2**
UNIT-III	**Deep Learning Architectures**					**Periods: 12**			
Unsupervised Pre-Trained Networks: Deep Belief Networks, Generative Adversarial Networks – Convolutional Neural Networks: Architecture, Layers – Recurrent Neural Networks: Architecture, LSTM Networks – Recursive Neural Networks: Architecture, Auto Encoders.									**CO2**
UNIT-IV	**Deep Learning Frameworks**					**Periods: 12**			
Introduction to Deep Learning Platforms and Software Libraries: H2O-Tensorflow- Pytorch- Caffe-Eclipse Deeplearning4j.									**CO3**
UNIT-V	**Deep Learning Applications**					**Periods: 12**			
Application of Deep Learning to Real-World Scenarios: Object Recognition and Computer Vision, Image and Video Processing, Text Analytics, Speech Recognition -Natural Language Processing									**CO4** **CO5**
Lecture Periods: 45	**Tutorial Periods: 15**		**Practical Periods: -**				**Total Periods: 60**		

Reference Books

1. S. Rajasekaran and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, Second Edition, PHI Learning Private Limited, 2017.
2. Josh Patterson and Adam Gibson, Deep Learning: A Practitioner's Approach, O'Reilly Media Inc, 2017.
3. Rajiv Chopra, Deep Learning: A Practical Approach, Khanna Publishing, 2018.
4. Ian Good fellow and Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.