

# **RIMT UNIVERSITY**

## **SCHOOL OF COMPUTER APPLICATION AND MULTIMEDIA**

### **List of Core Subjects for PhD Program**

The candidates need to select any one course from the following elective courses.

|             |  |     |
|-------------|--|-----|
| PHDCAM1103A | Advance Software Engineering           | 100 |
| PHDCAM1103B | Advance Data Communication and Network | 100 |
| PHDCAM1103C | Advance Data Warehousing and Mining    | 100 |
| PHDCAM1103D | Soft Computing                         | 100 |
| PHDCAM1103E | 3D Modeling & Animation                | 100 |

## PHDCAM1103A Advance Software Engineering

Max. Marks: 100

### ***Objective of the subject:***

- The student should be made to:
- Understand the phases in a software project
- Understand fundamental concepts of requirements engineering and Analysis Modelling.
- Understand the major considerations for enterprise integration and deployment.
- Learn various testing and maintenance measures

### **SECTION - I**

**SOFTWARE PROCESS AND PROJECT MANAGEMENT:** Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Software Project Management: Estimation – LOC and FP Based Estimation, COCOMO Model – Project Scheduling – Scheduling, Earned Value Analysis - Risk Management.

### **SECTION - II**

**REQUIREMENTS ANALYSIS AND SPECIFICATION:** Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management- Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

### **SECTION - III**

**SOFTWARE DESIGN:** Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

### **SECTION - IV**

**TESTING AND IMPLEMENTATION :** Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring.

### **SECTION - V**

**PROJECT MANAGEMENT:** Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA - Process and Project Metrics.

### ***Outcome of the subject:***

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

- Identify the key activities in managing a software project.
- Compare different process models.
- Concepts of requirements engineering and Analysis Modeling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.

#### TEXT/REFERENCE BOOKS:

1. Roger S. Pressman, “Software Engineering – A Practitioners Approach”, Seventh Edition, Mc Graw-Hill International Edition, 2010.
2. Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India,

#### **Instructions for the Paper-Setter**

The external paper will carry 50 marks and would be of three hours duration. The question paper will be divided into three groups, i.e., I, II and III. The question paper will consist of nine questions; three from each group.

#### **Instructions for the Candidates**

Candidates will be required to attempt five questions in all, selecting not more than two questions from each group.

### **PHDCAM1103B Advance Data Communication and Network**

Max. Marks: 100

#### ***Objective of the subject:***

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To introduce UDP and TCP Models.

#### **SECTION - I**

Data Communication and Computer Network: Elements of a Communication System, Transmission Modes, Transmission Impairments, Switching, Modulation, Multiplexing.

Physical Layer Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (Radio, Microwave, and Infrared). Network Communication Devices, Network Technologies: LAN, WAN, MAN, Network topologies: Star, Ring, Bus, Hybrid, Multipoint and Completely Connected Network. Introduction to ATM, ISDN, Cellular Radio and Communication Satellites.

#### **SECTION - II**

Switching: Circuit switching, packet switching, comparison.

Reference Models: OSI Reference Model, TCP/IP reference Model, Comparison of OSI and TCP Reference Model.

Data Link Layer Design issues: Framing, error control, Flow Control, Error Detection and correction; Elementary Data Link Protocols, Sliding Windows Protocols.

Medium Access Control: Aloha, CSMA protocols, Collision free protocols, Limited Contention Protocols; Wireless LAN protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.

### **SECTION - III**

Network Layer: Design issues, Virtual circuit and Datagram Subnet, Routing Algorithms, Optimality principle, Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast and Multi Cast Routing, Routing for Mobile hosts, Routing in Adhoc Networks, congestion Control Algorithm, General Principals Traffic Shaping, Leaky Bucket, Token Bucket.

### **SECTION - IV**

Transport Layer: Design issues, Quality of Services, Primitives Connection Management: Addressing, Connection Establishment and Releases. Flow control and Buffering, Crash recovery, Element of TCP/IP protocol: User Data gram Protocol, (UDP/TCP) Layering.

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security.

#### ***Outcome of the subject:***

- Students should be understand and explore the basics of Computer Networks and Various Protocols. He/She will be in a position to understand the World Wide Web concepts.
- Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile, and ad hoc networks.

#### **TEXT/REFERENCE BOOKS:**

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

#### **Instructions for the Paper-Setter**

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***Objective of the subject:***

The main objective of the course is designed to introduce the core concepts of data mining and data warehousing techniques and implementation.

**SECTION – I**

Data warehousing: Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

**SECTION – II**

Business Analysis: Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

**SECTION – III**

Data Mining: Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

**SECTION – IV**

Association Rule Mining and Classification: Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Backpropagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Prediction

**SECTION – V**

Clustering and Applications and Trends an Data Mining: Cluster Analysis - Types of Data – Categorization of Major Clustering Methods - K- means – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

***Outcome of the subject:***

The student will be able to

- Students should be understand and explore the basics of Computer Networks and Various Protocols. He/She will be in a position to understand the World Wide Web concepts.

- Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile, and ad hoc networks.

**TEXT/REFERENCE BOOKS:**

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

**Instructions for the Paper-Setter**

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**Instructions for the Candidates**

Candidates will be required to attempt five questions in all, selecting not more than two questions from each group.

***Objective of the subject:***

- To emphasize on learning the design, implementation and application of soft computing methodologies.
- To give a detailed understanding of how to obtain the solution of cross-disciplinary problems quickly, accurately and acceptably.
- To discuss and understand the capability of neural networks, fuzzy systems and genetic algorithms to acquire and apply knowledge in an intelligent manner.

**SECTION - I**

**Introduction:** Neural Networks, Application Scope of Neural Network, Fuzzy Logic, Genetic

Algorithm, Hybrid Systems, Soft Computing

**Artificial Neural Network:** Fundamental Concept, Evolution of Neural Networks, Basic Models of Artificial Neural

Network, Important Terminologies of ANNs, McCulloch-Pitts Neuron, Linear Separability, Hebb Network

**SECTION - II**

**Supervised Learning Network:** Introduction, Perception Networks, Back-Propagation Network, Radial Basis Function Network, Time Delay Neural Network.

**Associative Memory Networks:** Introduction, Training Algorithm of Pattern Association, Autoassociative Memory Network, Heteroassociative Memory Network, Bidirectional Associative Memory, Hopfield Networks (Discrete Only)

**Unsupervised Learning Networks:** Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Motor Maps, Adaptive Resonance Theory Network

**SECTION - III**

**Fuzzy Set Theory:** Fuzzy versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations.

**Fuzzy Systems:** Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based System, Defuzzification Methods, Applications

**Fuzzy Logic Control Systems:** Introduction, Control System Design, Architecture and Operation of FLC System, FLC system models, Applications of FLC systems

**SECTION - IV**

**Fundamentals of Genetic Algorithms:** Genetic Algorithms: History, Basic Concepts, Creation of Offsprings, Working Principle, Encoding, Fitness Function, Reproduction.

**Genetic Modeling:** Inheritance Operators, Cross Over, Inversion and Deletion, Mutation Operator, Bit-wise Operators.

***Outcome of the subject:***

At the end of the work student will be able to

- Get the knowledge of Soft Computing as Networks, Fuzzy Logic and Genetic Algorithms and its Hybrid Applications.

- Apply hybrid nature of Soft Computing techniques to real world problems by extending the capabilities of existing technologies in more effective and efficient manner.

#### TEXT/REFERENCE BOOKS:

- S.N. Sivanandam and S.N. Deepa, “Principles of Soft Computing”, Wiley India (P) Ltd.
- S. Rajasekaran and G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic, and Genetic Algorithms (Synthesis and Applications)”, PHI Education.

#### **Instructions for the Paper-Setter**

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## PHDCAM1103E **3D Modeling and Animation**

Max. Marks: 100

### **SECTION – I**

#### **Computer-based Animation & Getting Started with Max**

Definition of Computer-based Animation, Basic Types of Animation: Real Time, Non-real-time, Definition of Modeling, Creation of 3D objects. Exploring the Max Interface, Controlling & Configuring the Viewports, Customizing the Max Interface & Setting Preferences, Working with Files, Importing & Exporting, Selecting Objects & Setting Object Properties, Duplicating Objects, Creating & Editing Standard Primitive & extended Primitives objects, Transforming objects, Pivoting, aligning etc.

#### **2D Splines & Shapes & compound object**

Understanding 2D Splines & shape, Extrude & Bevel 2D object to 3D, Understanding Loft & terrain, Modeling simple objects with splines, Understanding morph, scatter, conform, connect compound objects, blobmesh, Boolean, Proboolean & procutter compound object

### **SECTION – II**

#### **3D Modelling**

Modeling with Polygons, using the graphite, working with XRefs, Building simple scenes, Building complex scenes with XRefs, using assets tracking, deforming surfaces & using the mesh modifiers, modeling with patches & NURBS

#### **Keyframe Animation**

Creating Keyframes, Auto Keyframes, Move & Scale Keyframe on the timeline, Animating with constraints & simple controllers, animation Modifiers & complex controllers, function curves in the track view, motion mixer etc

### **SECTION – III**

#### **Simulation & Effects**

Bind to Space Warp object, Gravity, wind, displace force object, deflectors, FFD space warp, wave, ripple, bomb, Creating particle system through parray, understanding particle flow user interface, how to particle flow works, hair & fur modifier, cloth & garment maker modifiers etc.

#### **Lighting & Camera**

Configuring & Aiming Cameras, camera motion blur, camera depth of field, camera tracking, using basic lights & lighting Techniques, working with advanced lighting, Light Tracing, Radiosity, video post, mental ray lighting etc.

### **SECTION – IV**

#### **Texturing with Max**

Using the material editor & the material explorer, creating & applying standard materials, adding material details with maps, creating compound materials & material modifiers, unwrapping UVs & mapping texture, using atmospheric & render effects etc

#### **Rendering with V-Ray**

V-ray light setup, V-ray rendering settings, HDRI Illumination, Fine-tuning shadows, Final render setting etc

#### **TEXT/REFERENCE BOOKS:**

1. Ted Boardman, 3d'sMax5Fundamentals, Techmedia publishers
2. Michael E. Mortenson, 3D Modelling, Animation, and Rendering, Createspace
3. 3dsmax7 Fundamentals by New riders publishers