TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

3-Year Master of Computer Application (MCA) Curriculum and Syllabus

Fourth Semester

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIU-PEN-T200	Career Advancement and Skill Development	1	0	1	2
TIU-PMG-T208	Professional Ethics and Human Values	2	0	0	2
TIU-PCA-T202	Programming in Java	3	1	0	4
TIU-PCA-T204	Distributed Data Base Management Systems	2	1	0	3
TIU-PCA-T214	Networking and Mobile Communications	2	1	0	3
TIU-PCA-T216	Internet of Things & Applications	2	1	0	3
TIU-PCA-T218	Cloud Computing	2	1	0	3
TIU-PCA-T212	Management Fundamentals & information Systems	2	0	0	2
Practical					
TIU-PCA-L220	Web Technologies Lab(Using Dot Net)	0	2	3	2
TIU-PCA-L202	Programming in Java Lab	0	0	3	2
Sessional					
TIU-PES-S298	Entrepreneurship Skill Development	0	0	3	2
Total Credits					28

NOTE: YELLOW COLORED ROW IS ONLY FOR MCA2 (SPRING 2018). GREEN COLORED ROW IS ONLY FOR IMCA2.

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External Expert-1 (Prof. Subhadip Basu, J.U.)
External Expert-2 (Prof. Amlan Chakraborty, C.U.)
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DETAILED SYLLABUS

Career Advancement and Skill Development

TIU-PEN-T200

L-T-P: 1-0-1 **Credit: 2**

#Interview Skill Management	Types of Interview & Dress Code	1
	Aptitude Interview Grooming	
	Technical Interview Questions	
	Advanced English	1
Total		**2**

Professional Ethics and Human Values

TIU-PMG-T208

L-T-P: 2-0-0 **Credit: 2**

1. Human Values

Morals, Values and Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character.

2. Engineering Ethics

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories. Valuing Time – Co-operation – Commitment –

3. Engineering As Social Experimentation

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

4. Safety, Responsibilities and Rights

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies.

5. Global Issues

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-

Recommended Books:

Main Reading:

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York 1996.

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2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Supplementary Reading:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint now available).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

Programming in Java
TIU-PCA-T202

L-T-P: 3-1-0 **Credit: 4**

Unit I

Introduction to Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method Abstraction and Stepwise Refinement, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes, Use of Keywords: static, final, this, Class Abstraction and Encapsulation, Strings and Text I/O, Inheritance and Polymorphism, use of super keyword, Overriding vs. Overloading, Object: The Cosmic Super class, Abstract Classes and Interfaces, Packages, Object-Oriented Design and Patterns.

Unit II

GUI Programming: GUI Basics, Graphics, Event-Driven Programming, Creating User Interfaces, Applets and Multimedia, Exception Handling, Binary I/O, Files & Streams, Recursion, Dynamic Binding, Generics & Generic Programming, Java Collections Framework, Algorithm Efficiency, Searching & Sorting.

Unit III

Multithreading, Networking, JDBC, Internationalization, AWT, Advanced GUI Programming: MVC, JavaBeans and Bean Events, Containers, Layout Managers, and Borders, Menus, Toolbars, Dialogs and Swing Models, JTable and JTree, New Features of Java.

Recommended Books:

Main Reading:

1. Y. Daniel Liang, "Introduction to Java Programming: Comprehensive Version", 7th Edition, 2009, Pearson Education Inc., New Delhi.
2. Herbert Schildt "Java The Complete Reference", 8th Edition, 2011, McGraw Hill Education (India) Private Limited.

Supplementary Reading:

1. Richard A. Johnson, "An Introduction to Java Programming and Object Oriented Application Development", First Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. E. Balagurusamy, "Programming with Java: A Primer"

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3. Cay S. Horstmann, "Big Java", 3rd Edition, Wiley India Pvt. Ltd., New Delhi.

Distributed Data Base Management Systems

TIU-PCA-T204

L-T-P: 2-1-0 **Credit: 3**

Distributed DBMS features and needs. Reference architecture. Levels of distribution transparency, replication. Distributed database design – fragmentation, allocation criteria.

Storage mechanisms. Translation of global queries. / Global query optimization. Query execution and access plan. Concurrency control – 2 phases locks. Distributed deadlocks. Time based and quorum based protocols. Comparison. Reliability- non-blocking commitment protocols.

Partitioned networks. Checkpoints and cold starts. Management of distributed transactions- 2 phase unit protocols. Architectural aspects. Node and link failure recoveries.

Distributed data dictionary management. Distributed database administration. Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled.

Alternative architecture. Development tasks, Operation- global task management. Client server databases-SQL server, open database connectivity. Transactions & Query-Processing.

Recommended Books:

Main Reading:

Principles of Distributed Database Systems. Ozsu and Valduriez. Prentice Hall.

Supplementary Reading:

1. Distributed Systems: Concept and Design. Coulouris, Dollimore, and Kindberg. AW.
2. Distributed Database Principles and Systems. Ceri and Pelagatti. McGraw Hill.

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Networking & Mobile Communications

TIU-PCA-T214

L-T-P: 2-1-0 **Credit: 3**

1. Overview of Computer Networks:
Overview of OSI Model: Significance of Layered Model, PDUs, SDUs, IDUs, Higher Layer Protocols Network Classification, Switching and Components.

2. Multiple Access Technologies for Wireless Communication:
FDMA, TDMA: Fixed TOM, Pure ALOHA and Slotted ALOHA CDMA: Spread Spectrum Techniques.

3. Mobile Data Communication:
Cellular Telephony, Radio propagation: Small Scale Fading and Multipath Fading, Speech Coding, Error Coding and Error Correction. Mobility Management, Hand off Management: Soft Hand off and Hard Hand off, Handoff architecture, Switching and authentication, MTSO Interconnections. Circuit Switched Data Services on Cellular Networks, Packet Switched Data Services on Cellular Networks.

4. Personal Wireless Communication Systems:
Personal Communication Systems (PCS) Architecture, Cordless Telephony (CT2), Digital Enhanced Cordless Telecommunications (DECT), Personal Access Communication System (PACS), Personal Handy Phone System (PHS).

5. 3G and 4G Wireless Standards:
GPRS Architecture, GPRS Network, WCDMA, LTE, Wi-MAX.

Recommended Books:

Main Reading:

1. Raj Pandya, "Mobile and Personal Communication Systems & Services"
2. Yi- Bing Lin and Imrich Chlamtac, "Wireless and Mobile Network Architectures"
3. Rajesh & Balasubramanian "Computer Networks : Fundamentals and Application"

Supplementary Reading:

1.Jochen Schiller, "Mobile Communication"
2.C.Y. William Lee, "Mobile Cellular Telecommunications : Analog & Digital Systems"
3.Gilbert Held, "Building A Wireless Network"
4.Theodore S. Rappaport, "Wireless Communications: Principles and Practice"

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Internet Of Things & Applications

TIU-PCA-T216

L-T-P: 2-1-0 **Credit: 3**

IoT & Web Technology: The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization.

M2M to IoT – A Basic Perspective: Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

IoT Architecture -State of the Art: Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

IoT Applications for Value Creations: Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

Internet of Things Privacy, Security and Governance: Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

Books for Main Reading:

1. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1 st Edition, VPT, 2014

2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1 st Edition, Apress Publications, 2013.

Book for Supplementary reading:

1. Cuno Pfister, Getting Started with the Internet of Things, O‟Reilly Media, 2011, ISBN: 978-1-4493- 9357-1

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Cloud computing
TIU-PCA-T218

L-T-P: 2-1-0 **Credit: 3**

Unit-1: Distributed System Models and Enabling Technologies

Scalable Computing Service over the Internet: The Age of Internet Computing, scalable computing Trends and New Paradigms, Internet of Things and Cyber-Physical Systems. System Models for distributed and Cloud Computing: Clusters of Cooperative Computers, Grid Computing Infrastructures, Peer-to-Peer Network Families, Cloud Computing over the Internet. Software Environments for Distributed Systems and Clouds: Service-Oriented Architecture (SOA), Trends towards Distributed Operating Systems, Parallel and Distributed Programming Models. Performance, Security, and Energy-Efficiency: Performance Metrics and Scalability Analysis, Fault-Tolerance and System Availability, Network Threats and Data Integrity, Energy-Efficiency in Distributed Computing.

Unit-2: Computer Clusters for scalable parallel computing

Clustering for massive parallelism: Cluster Development Trends, Design Objective of Computer Clusters, Fundamental Cluster Design issues. Virtual machines and Virtualization of clusters and Data centers: Implementation levels of virtualization: levels of virtualization Implementation, VMM Design requirements and providers, Virtualization support at the OS level, Middleware Support for Virtualization.

Unit-3: Cloud Platform Architecture over Virtualized Data Centers

Cloud computing and Service Models: Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure-as- a- Service (IaaS), Platform- and Software-as-a-Service (Paas, SaaS). Architectural Design of Compute and Storage Clouds: A Generic Cloud architecture Design, Layered Cloud Architectural development, Virtualization Support and Disaster Recovery, Architectural Design Challenges.

Unit-4: Public Cloud Platforms

GAE, AWS, and Azure: Smart Cloud, Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Service (AWS), Microsoft Windows Azure. Inter-cloud Resource Management: Extended Cloud Computing Services, Resource Provisioning and Platform Deployment, Virtual Machine Creation and Management. Cloud Security and Trust management: Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques.

Unit-5: Cloud Programming and Software Environments

Features of Cloud and Grid Platforms: Cloud Capabilities and Platform Features,Traditional Features Common to Grids and Clouds, Data Features and Databases, Programming and Runtime Support. Parallel and Distributed Programming Paradigms: Parallel Computing and Programming Paradigms, MapReduce, Twister and IterativeMapReduce, Hadoop Library from Apache.

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Unit-6: Programming Support of App Engine

Programming the Google App Engine, Google File System (GFS), Bigtable, Google'sNOSQL system, Chubby, Google's Distributed Lock service. Programming on AmazonAWS and Microsoft Azure: Programming on Amazon EC2, Amazon Simple Storage ServiceS3, Amazon Elastic Block Store EBS and SimpleDB, Microsoft Azure programming support. Emerging Cloud Software Environments: Open Source Eucalyptus and Nimbus, Open Nebula, Sector/Sphere, and Open Stack, Manjrasoft Aneka Cloud and Appliances.

Unit-7 : Ubiquitous Clouds and the Internet of Things

Performance of Distributed Systems and the Cloud Data-intensive Scalable Computing(DISC), Quality of Service in Cloud computing, Benchmarking MPI, Azure, EC2,MapReduce, and Hadoop. Online social and Professional Networking: Online SocialNetwork Characteristics, Graph-Theoretic Analysis of social networks, communities and applications of social networks, Facebook: The World's Largest Content-Sharing Network, Twitter for Micro blogging, News and Alert Services.

Books for Main Reading:

1. Buyya, Selvi ," Mastering Cloud Computing ",TMH Pub
2. Kumar Saurabh, "Cloud Computing" , Wiley Pub
3. Krutz , Vines, "Cloud Security " , Wiley Pub
4. Velte, "Cloud Computing- A Practical Approach" ,TMH Pub
5. Sosinsky, " Cloud Computing" , Wiley Pub

Books for Supplementary Reading:

1. Gautam Shroff, Enterprise Cloud Computing Technology Architecture App
lications [ISBN: 978-0521137355]
2. Dimitris N. Chorafas, Cloud Computing Strategies, [ISBN: 1439834539]

Management Fundamentals & information Systems

TIU-PCA-T212

L-T-P: 2-0-0 **Credit: 2**

Web Technologies Lab(Using Dot Net)

TIU-PCA-L220

L-T-P: 0-0-3 **Credit: 2**

As directed by the faculty.

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Programming in Java Lab

TIU-PCA-L202

L-T-P: 0-0-3 **Credit: 2**

Unit I Introduction to Java

1. Program on creation of classes and using different types of function.
2. Program using constructor/function overloading
3. Program on passing Object as parameter to a function
4. Program using static and final variable and methods

Unit II Program based on Array, Inheritance and Wrapper Class

1. Program to perform different operations on Array and String
2. Program using Interface and Inheritances covering domain like educational institute, banking etc.
3. Program using Wrapper class to cover auto boxing and unboxing

Unit III Program on packages and exception Handling

1. Program using packages to demonstrate the scope of access specifier
2. Program to On Exception Handling Mechanism covering
(Try, Catch, Throw, Throws, Finally)

3. Program to create your own exception class

Unit IV Program on Applet and multithreading

1. Program on dynamic applet creation using image/media etc
2. Program on Multithreading
3. Program to create multiply threads doing different task.
4. Program based on thread priority and thread synchronization

Unit V Program on File Handling and JDBC

1. Program using IO streams
2. Program using object serialization and object De-serialization
3. JDBC: All data base operation using Access /oracle/MySQL as backend

Unit VI Program to create rich User interface using various swing component

Unit VII JSP

1. Sample program to demonstrate JSP syntax and semantics
2. Program based on directive and error object
3. Program based on cookies and Sessions

Unit VIII Servlets

1. A Simple Servlet Generating Plain text/ HTML
2. Program based on cross page posting and post back posting (client request and server response)

Unit IX EJB (Enterprise Java Beans)

1. Program on session, message and entity bean

Unit X Introduction to Framework: 1. Struts

2. Basic Configuration for struts
3. Program based on Action validation and control in struts
4. Program based on integration of JSP and Servlets with struts

Unit XI Mini Project in Java

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