Post Graduate Diploma in Cloud Technology and Information Security

Course Duration: 1 year (2 Semesters, 40 Credits)

Course Description:

On the Cloud Technology front, the course will provide students with the fundamental knowledge of all aspects of Cloud Technology. The course focuses on Virtualization Technology, Cloud Technology.

On the Information Security front, this course equips the students with the concepts and the fundamental technical skills in Information Security. The focus of the course is on Cryptography, Ethical Hacking, Computer Forensics and Virtualization and Cloud Security

Employment Opportunities

Global Scenario

- Combined Market of Private and Public Cloud Services - $11 Billion in 2012
- Poised to grow to $ 65 to 85$ Billion in 2015

McKinsey Analysis: Winning in the SMB Cloud: Charting a Path to Success

Growth and Forecast

- There are currently about 50 million enterprise users of Cloud Office Systems which represent only 8 percent of overall office system users, excluding China and India.
- Predicts that a major shift toward cloud office systems will begin by the first half of 2015 and reach 33 % penetration by 2017.

Gartner Report

- Worldwide spending on public IT cloud services will be more than $40 billion in 2014
- Expected to approach $100 billion in 2016.
- Over the 2012–2016 forecast period, public IT cloud services will enjoy a compound annual growth rate (CAGR) of 26.4%, five times that of the IT industry overall

IDC research

Jobs and Opportunities - Global

- Cloud Computing to Create 14 Million New Jobs by 2015.
- By 2015, business revenues from IT innovation enabled by the cloud could reach US$1.1 trillion a year.

Indian Scenario

Market Size - India

The public cloud services market in India is forecast to grow 36 percent in 2014 to total $443 million, up from $326 million in 2013, according to Gartner, Inc. Infrastructure as a service (IaaS), including cloud computing, storage and print services, continues as the fastest-growing segment of the market in India, growing 22.7 percent in 2013 to $43.1 million, and it is expected
to grow 39.6 percent in 2014 to $60.2 million. Infrastructure as a service (IaaS), including cloud compute, storage and print services continued as the fastest-growing segment of the market, growing 42.4 percent in 2012 to $6.1 billion and expected to grow 47.3 percent in 2013 to $9 billion.

Jobs and Opportunities - India

India will create over 2 million jobs in Cloud sector, predicts a study commissioned by Microsoft and conducted by International Data Corporation (IDC).

Career Progression Path - Cloud Technology

Industry	**Entry level (0-1 yrs exp.)**	**Mid Level (3-5 yrs exp.)**	**Advanced level (5 yrs plus exp.)**
Average Salary	**Rs.4,00,000 – 5,00,000**	**Rs.4,00,000 – 8,00,000**	**Rs. 8,00,000 +**
Job Role	Cloud Network Engineer	Cloud Engineer	Cloud Architect ,Cloud Consultant
	Cloud Software Engineer	Sr. Cloud Engineer Manager Cloud Technology	Manager Cloud Technology
	Cloud Developer	Cloud Provisioning Engineer	Datacenter Manager
	Cloud Systems Administrator (Level 1)	Cloud Systems Administrator (Level 2)	Cloud Systems Administrator (Level 3)

	Cloud Security Specialist	Security Engineer	Manager Cloud Security

1. Course Objective:

This unique course provides dual career options for the students in the fast growing technology sectors of Cloud Technology and Information Security. This specialized course offers practical know-how of the current trend Technology – Cloud and Information Security. These sectors have the potential to grow exponentially and they provide challenging job opportunities for young professionals with the right skill sets.

Course Duration: 1 Year

Post Graduate Diploma in Cloud Technology and Information Security

Course Matrix

Semester I	Theory 1	Effective Communication Skills - I	45 Hours	Credits
	Theory 2	Introduction to Cloud Technology	60 hours	Credits

	Theory 3	Principles of virtualization	60 hours	Credits
	Theory 4	Information Security Fundamentals	45 hours	Credits
	Theory 5	Cryptography Fundamentals	45 hours	Credits
	Lab 1	Principles of Virtualization Lab	60 hours	Credits
	Lab 2	Introduction to Cloud Technology Lab	60 hours	Credits
	Lab 3	Project	60 hours	
TOTAL HOURS			**435 hours**	**Credits**
Semester II	Theory 1	Effective Communication Skills - II	45 Hours	Credits
	Theory 2	Introduction to Cloud Computing Solutions	60 hours	Credits
	Theory 3	Virtualization and cloud security	60 hours	Credits
	Theory 4	Ethical Hacking Fundamentals	60 hours	Credits
	Lab 1	Introduction to Cloud	60	Credit

		Computing Solutions Lab	hours	
	Lab 2	Ethical Hacking Fundamentals Lab	45 Hours	Credit
	Lab 2	Project	120 hours	Credits
			405 hours	**Credits**

Note: Credits are calculated based on 15 working weeks/semester.

Syllabus - Semester I

Theory 1: Effective Communication Skills (45 Hours)

Introduction (9 hours) - Tips to learn a new language - The process of learning a language - Basics of English - The parts of speech – Noun; Topic discussion - Introduce Yourself
Verb - Verb Exercise - Tense - Present, Past, Future; Topic Discussion - Jaipur – Why is it called the Pink City?

Vocabulary(9 hours) – verbs - 15 words with meaning in Hindi - Perfect Tense - Tongue – Twisters to improve the pronunciation; Topic Discussion - IPL Matches
Verbs - Vocabulary 15 words - Grammar - Auxiliary Verbs - Verb - Exercise - Learn & Know – Fruits - Tongue Twisters - Topics Discussion - Hollywood v/s Bollywood, Indian Food v/s Junk Food

Vocabulary and Verbs II (9 hours) - Vocabulary - verbs - 15 words - Adjective - Degrees of comparison - Tongue – Twisters; - Translation - Hindi to English 30 sentences; Topic discussion - If I were the Prime Minister of the country.
Vocabulary - Verbs – 15 words - Grammar - Adverbs ; Story Telling (Story of your choices)

Comprehension and Grammar (9 hours) - Vocabulary - Verbs - 15 words - Grammar - Pronoun; Reading Comprehension – Articles or short stories would be provided
Comprehension - continued. This is done to enhance the reading & listening skills
Grammar – Articles; Sentence and paragraph formation keeping articles in mind
Grammar - Preposition; Story writing
Grammar - Adjectives ; Letter Writing – Business Communication & Emails
Grammar - Conjunction - Kinds of Sentences - Simple, Compound & complex sentences

Comprehension and Grammar (9 hours) - Effective Speaking and Analytical Skills
Vocabulary - Singular & Plural; Grammar - Interrogation; Sentence formations
Grammar - Exclamation - Conclusion of Parts of Speech - Why the parts of speech are important - Vocabulary - Genders
Grammar - Direct and Indirect Speech; Group Discussions

Theory 2: Introduction to Cloud Technology (60 Hours)

Introduction (12 hours): Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

Cloud Computing Companies and Migrating to Cloud (12 hours) : Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

Cloud Cost Management and Selection of Cloud Provider (12 hours) : Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, Selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration

Governance in the Cloud (12 hours) : Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

Ten Cloud DO and DONTS (12 hours) : Don't be reactive,do consider the cloud a financial issue, don't go alone, do think about your architecture, don't neglect governance, don't forget about business purpose, do make security the centerpiece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project.

Text Books

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

Reference Books:

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010

Theory 3 : Principles of virtualization (60 hours)

Basics of Virtualization (12 hours): configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images

Deploying and Managing an Enterprise Desktop Virtualization Environment (12 hours): configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images

Deploying and Managing a Presentation Virtualization Environment (12 hours): Prepare and manage remote applications: configuring application sharing, package applications for deployment by using RemoteApp, installing and configuring the RD Session Host Role Service on the server.

Accessing published applications (12 hours): Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings.

Understanding Virtualization Software (12 hours) - List of virtualization Software available . Vmware- introduction to Vsphere, ESXi, VCenter Server and Vsphere client. Creating Virtual Machine.. Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots. Monitor the performance of a Hyper-v server, Citrix XENDesktop fundamentals

References:

1. Virtualization with Microsoft Virtual Server 2005 by Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam Syngress Publications, 2006
2. Virtualization--the complete cornerstone guide to virtualization best practices by Ivanka Menken, Gerard Blokdijk - Lightning Source Incorporated, 2008
3. Virtualization: From the Desktop to the Enterprise By Chris Wolf, Erick M. HalterEBook, 2005

Theory 4: Information Security Fundamentals (45 Hours)

Introduction to Information Security (10): Definition and Evolution of Information Security, Basic Principles and critical concepts, Components of Information System, Balancing Information Security and Access, Security professional in the organization

The Need for IT Security (12 hours): Business needs - Protecting functionality and data, Safeguarding technology assets - Threats- to Intellectual property, Espionage and trespass, Sabotage and vandalism, Attacks - Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, Spam, Social Engineering

Risk Management (10 hours): Definition and Identifying Risk, Assessing risk and impact based on probability of occurrence, Basics for risk documentation, Risk mitigation strategy options, Categories used for classifying controls

Network Infrastructure Security and Connectivity (13 hours): Understanding Infrastructure Security: device based and process-based security, Network Monitoring : Firewall, Intrusion Detection System, Intrusion Prevention system, OS and Network Hardening, Application Hardening, Physical and Network Security - Physical and Network Security- Policies, Standards and Guidelines

References:

1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
2. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 2011

Theory 5: Cryptography Fundamentals (45 Hours)

Introduction (9 hours): The Need for Security, Security Approaches, Principles of Security, Text and Cipher Text, Substitution and Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Cryptography, Steganography, Key Range and Key Size-Types of Attacks.

Symmetric Key Cryptographic Algorithms (9 hours): Algorithm Types and Modes,Overview, DES, IDEA, RC5, AES, Linear and Differential Cryptanalysis

Asymmetric Key Cryptographic Algorithms (9 hours): Overview, RSA, Digital Signature, Knapsack Problem

Public Key Infrastructure (9 hours): Digital Certificates, Private Key Management, Public Key Cryptographic Standards, PKI and Security, Internet Security Protocols: SSL, SHTTP, SET, Electronic Money, Email Security, WAP Security

User Authentication Mechanism (9 hours): Authentication Basics, Password, Authentication Tokens, Certificate-based Authentication, Biometric Authentication, Kerberos

Text Books:

1. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons
2. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone “Handbook of Applied Cryptography”, CRC Press.

Reference Books:

1. Cryptanalytic attacks on RSA – by Song Y. Yan 2005
2. Official (ISC)2 Guide to the CISSP CBK, Second Edition - harold F. Tipton 2005
3. Cryptography demystified –by John E. hershey 2000
4. Cryptography: An Introduction by V. V. I Ashchenko, Pub: American Mathematical Society – 2002

Lab 1: Principles of Virtualization Lab (60 Hours)

1. Installing Vmware ESXi server (12 hours)
2. Installing Vmware vCenter with all the prerequisites (12 hours)
3. Creating Virtual Machines using vCenter server (12 hours)
4. Modifying Virtual Machine settings (12 hours)
5. Clone a VM (12 hours)

Reference:

1. Virtualization with Microsoft Virtual Server 2005 by Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam Syngress Publications, 2006
2. Virtualization--the complete cornerstone guide to virtualization best practices by Ivanka Menken, Gerard Blokdijk - Lightning Source Incorporated, 2008
3. Virtualization: From the Desktop to the Enterprise By Chris Wolf, Erick M. HalterEBook, 2005

Lab 2: Introduction to Cloud Technology Lab (60 Hours)

Basic Cloud Architecture (15 hours) - Study the basic cloud architecture and represent it using a case study. Enlist Major difference between SAAS PAAS & Iaas also submit a research done on various companies in cloud business and the corresponding services provided by them , tag them under SAAS , Paas & Iaas.

Cloud Service Providers (15 hours) - Study and present a report on Jolly cloud.

1. Present a report on obstacles and vulnerabilities in cloud computing on generic level
2. Present a report on Amazon cloud services.
3. Present a report on Microsoft cloud services.
4. Present a report on cost management on cloud

Case Study (15 hours) - Enlist and explain legal issues involved in the cloud with the help of a case study and explain the process of migrating to cloud with a case study.

Google Cloud (15 hours) - Present a report on google cloud and cloud services.

Text Books:

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

References:

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010

Lab 3 : Project (60 Hours)

Details of the project will be provided on commencement.

Syllabus - Semester II

Theory 1: Effective Communication Skills - II (45 hours)

Advanced Grammar (9 hours) - Recap of Grammar done in Semester I

Grammar - Active and Passive Voice; Extempore

Vocabulary (9 hours) - Vocabulary - Opposites ; JAM Sessions

Communication Skills I (9 hours) -Communication Skills – Introduction, Good Communication v/s Effective Communication

Communication Skills II (9 hours) - How to become an Effective Communicator, Styles of Communication, The art of being Assertive

Grammar (9 hours) - Listening Skills – Introduction, Hearing or Listening, The qualities of being a good listener; Telephone etiquette

Theory 2 : Introduction to Cloud Computing Solutions (60 hours)

Introduction (12 hours) - Introduction to MS. Azure, Virtual Machines: Creating Virtual Machines, Difference Between Basic and Standard VMs,Logging in to a VM and Working, Attaching an empty hard Disk to VM, hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM,Creating a VM from a custom Image, Shut down VM without Getting Billed,VM Pricing

Managing Infrastructure in Azure (12 hours) - Managing Infrastructure in Azure: Azure Virtual Networks, highly Available Azure Virtual Machines, Virtual Machine Configuration Management, Customizing Azure Virtual Machine Networking. Load Balancing: Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer

Windows Azure (12 hours) - Azure Storage: What is a Storage Account, Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control Automation: Introduction Windows Power Shell ,Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script

SQL Azure (12 hours) - SQL Azure: Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Tables, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.

Websites (12 hours) - Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Default page for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between Free, Shared, Basic and Standard websites, Creating a website using Visual studio.

Text Book:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

Reference Books:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
2. Windows Azure Step By step by Roberto Brunetti.

Theory 3 : Virtualization and cloud security (60 hours)

Introduction to Virtualization & Cloud (12 hours) - Virtualization and Cloud computing concepts - Private cloud Vs Public cloud, IAAS, PAAS & SAAS concepts, Virtualization security concerns – hypervisor and host/Platform Security, Security communications between - Guest instances, hosts and Guests

Cloud Security (12 hours) -Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol, Cloud Controls Matrix, Complete Certificate of Cloud Security Knowledge (CCSK)

Cloud Trust Protocol & Transparency (12 hours) - Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Concepts, Security, Privacy & Compliance aspects of cloud

Cloud Controls Matrix &Top Cloud Threats (12 hours) - Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model, Requirements of Security as a Service (Secaas) model, Top Security threats to the cloud model.

Cloud Security Architecture (12 hours) - Security Governance and Risk Management in Cloud; Compliance and Audit issues; Portability and Interoperability issues; Business Continuity Management and Disaster Recovery in the Cloud

References:

1. Visible Ops Private Cloud – Andi Mann, Kurt Miline and Jeanne Morain, IT Process Institute, Inc.; first edition (April 8, 2011)
2. Cloud Computing Explained – John Rhoton 2009

Theory 3 : Ethical Hacking Fundamentals (60 hours)

Introduction to Ethical Hacking (15 hours) - Hacking Methodology, Process of hacking. **Footprinting and Scanning:** Footprinting, Scanning. **Enumeration:** Enumeration. **System hacking and Trojans:** System hacking, Trojans and Black Box Vs White Box Techniques.

Attacking Methodology (15 hours) - Denial of Service, Sniffers. **Session hijacking and hacking Web Servers:** Session hijacking, hacking Web Servers. **Web Application Vulnerabilities and Web Based Password Cracking:** Web Application Vulnerabilities, Web Based Password Cracking Techniques

Web and Networking Hacking (15 hours) - SQL Injection, hacking Wireless Networking. **Viruses, Worms and Physical Security:** Viruses and Worms, Physical Security. **Linux hacking:** Linux hacking. **Evading IDS and Firewalls:** Evading IDS and Firewalls

Report Writing and Mitigation (15 hours) - Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Text Books:

1. Hacking Exposed 7th Edition, by Stuart McClure, Joel Scambray, George Kurtz – McGraw hill- 2010

References:

1. Basic of hacking and Penetration – Patrick Engerbrestson 2010

Lab 1 : Introduction to Cloud Computing Solutions Lab (60 hours)

1. Create and document the process of creating a windows azure account.
2. Create a virtual machine from the gallery of windows server 2008 R2.
3. Create a virtual machine using the option “quick Create”.
4. Create a custom VM and Capture the image.
5. Create a vm from a captured image.
6. Add VMs to a cluster and deploy load balancer on the same.
7. Create and publish / host a webpage in windows azure.
8. Create a website using Visual studio.
9. Create a SQL server DB , Create tables and add data to the table .
10. Test basic sql commands on the table created in the previous step.
11. Migrate an on premise DB to Azure.
12. Create a storage account in Azure.

Text Book:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010.

References:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011.
2. Windows Azure Step By step by Roberto Brunetti.

Lab 2 : Ethical Hacking Fundamentals Lab (45 hours)

1. Passive Reconnaissance using “Who is” and Online tools
2. Active Reconnaissance using “Sampad” and web site details
3. Full Scan, Half Open Scan and Stealth scan using “nmap”
4. UDP and Ping Scanning using “Advance Lan Scanner” and “Superscan”
5. Packet crafting using “Packet creator” tools
6. Exploiting NetBIOS vulnerability
7. Password Revelation from browsers and social networking application
8. Creating and Analyzing spoofed emails
9. Creating and Analyzing Trojans
10. OS password cracking

Text Books:

1. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010

Reference:

1. Information Security Management handbook, Volume 4 - Micki Krause, ISC2 Press, 2007

Lab 3 : Project (120 hours)

Details of the project will be provided on commencement.

Hardware Requirements - CT & IS				
Labs - Student Nodes & Phones				
Hardware	**Required Resources**	**Numbers**	**Remarks**	**Required Numbers**
Semester I and II				
Processors	Intel Core i5 - 2.60GHz	Per Student node		One per student
RAM	16 GB	Per Student node		One per student
HDD Capacity	500GB	Per Student node		One per student
NIC Card	1 GBPS	Per Student node		One per student
Speakers	1 per lab	1 Set	Speakers required in each Lab	6 Channel speakers
Graphic Cards	NVDIA	Per Student node	Dedicated graphics card, 128 or 256 MB of memory, WDDM 1.1 (Windows 7) drivers, DirectX 9 and 10 capable.	One per student
DVD Drives (RW)	DVD writer			1
Keyboard and Mouse		Per Student node		One per student
Microphone	1 per Lab	1 per Lab		1 per Lab

Web Camera	Logitech	1		1
Headphone & Mic	Logitech PC Headset	2		2
Tools	Crimping tools+ LAN tester + score driver toolkit	1 sets		
Wireless router and access point	CISCO	1		1 per lab
CISCO 48 port Switch (Manageable)		1		1 per lab
Network Patch panel and laying the cable		Per Student node		
Rack for Mounting the Routers and Switches		8 feet		
Antistatic Gloves		2 pairs		
500 GB Hard Drive		1		
Class Room/Lab - Facilities				
AC	1.5 ton		1 per lab	1
Projectors	1	1	1 Ceiling mounted projector required in each class/lab	1

Faculty Systems	1	1	Faculty System with Internet	1
White Boards	1	1		1
Internet Line (4 MBPS)	2	2	For guest lectures and internet access for student learning/projects	
Software Requirements				
Operating System	Windows 7 or 8, Linux	Per student node		1 per node
Office Tool	Microsoft office	Per student node	For windows OS	1 per node
Virtualization Software	VMWARE workstation , ESX (latest version)	Per student node		1 per node
Other basic software like Adobe Reader, WinRar, VLC media player, Google Chrome, etc.				
Operating system	RHEL 6 (Server and client)	Per student note		1 per node
Server Operating system	Windows Server 2008 R2	Per student node		1 per node
Cybercheck Suite	C-DAC	Per student node		4
Elcomsoft Password recovery	Elcomsoft	Per student node		25
Invisible Secrete	east-tec	Per student node		25
Handy recovery	handyrecovery	Per student node		25

F-Dac	C-DAC	Per student node		25
Matriux	Matriux	Per student node		25
Superscan	MaCafee	Per student node		25
Nmap	Nmap	Per student node		25
Paros	sourceforge	Per student node		25
Cain and Abel	oxid.it	Per student node		25
ADS Manager	joomprod	Per student node		25
Cellebrite	Cellebrite	Per student node		4
Azure	Azure Account	Instructor	For instructor use only*	1

S/W / H/W	Required Resources	Required Numbers
Systems	Same as lab machine setup	1 per faculty
Software	Same as lab machine setup	1 per faculty
Internet	Same as lab machine setup	1 per faculty

Annexture 1

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering & Technology
Course and Examination Scheme of Post Graduate Diploma in Cloud Technology and Information security
First Semester

Subject Code	HR	Subject	Teaching Scheme				Examination Scheme								
			Hours per week			No. of Credits	Theory					Practical			
			L	T	P		Duration of Paper (Hrs.)	Max. Marks University Assessment	Max. Marks College Assessment	Total Marks	Min. Passing Marks	Max. Marks University Assessment	Max. Marks College Assesment	Total Marks	Min. Passing Marks
PGDCT101T	45	Effective Communication Skills - I	02	01	-	03	01	30	20	50	20	-	-	-	-
PGDCT102T	60	Introduction to Cloud Technology	04	-	-	04	03	80	20	100	40	-	-	-	-
PGDCT102P	60	Introduction to Cloud Technology Lab	--	-	04	02	-	-	-	-	--	25	25	50	25
PGDCT103T	60	Principles of virtualization	04	-	--	04	03	80	20	100	40	-	-	-	-
PGDCT103P	60	Principles of virtualization Lab	-	-	04	02	-	-	-	-	--	25	25	50	25
PGDCT104T	45	Information Security Fundamentals	03	-	-	03	02	40	10	50	20				
PGDCT105T	45	Cryptography Fundamentals	03	-	-	03	02	40	10	50	20				

PGDCT106P	60	Minor Project	--	-	04	04	-	-	-	-	--	50	50	100	50
Total	**435**		**16**	**01**	**12**	**-**	**-**	**270**	**80**	**350**	**-**	**100**	**100**	**200**	**-**
	Semester Total	**29 Hrs**				**25**	**Marks 550**								

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Faculty of Engineering & Technolog

Course and Examination Scheme of Post Graduate Diploma in Cloud Technology and Information security

Second Semester

Subject Code		Subject	Teaching Scheme				Examination Scheme								
			Hours per week				Theory					Practical			
	HR		L	T	P	No. of Credits	Duration of Paper (Hrs.)	Max. Marks University Assessment	Max. Marks College Assessment	Total Marks	Min. Passing Marks	Max. Marks University Assessment	Max. Marks College Assesment	Total Marks	Min. Passing Marks
PGDCT201T	45	Effective Communication Skills - II	02	01	-	03	01	30	20	50	20	-	-	-	-
GDIR202T	60	Introduction to Cloud Computing Solutions	04	-	-	04	03	80	20	100	40	-	-	-	-
PGDCT202P	60	Introduction to Cloud Computing Solutions Lab	--	-	04	02	-	-	-	-	--	25	25	50	25
PGDCT203Y	60	Ethical Hacking Fundamentals	04	-	-	04	03	80	20	100	40	-	-	-	-

PGDCT203P	45	Ethical Hacking Fundamentals Lab	--	-	03	02	-	-	-	-	--	25	25	50	25
PGDCT204T	60	Virtualization and cloud security	04	-	-	04	03	80	20	100	40				
PGDCT205P	120	Project	--	-	07	07	-	-	-	-	-	100	100	200	100
Total	**450 hours**		**14**	**01**	**15**	**-**	**-**	**270**	**80**	**350**	**-**	**150**	**150**	**300**	**-**
	Semester Total		**30**			**26**	**Marks 650**								