# **NEP NEW SYLLABUS**

# ESSENTIALS OF CLOUD COMPUTING AND SECURITY

MCA (Management): Semester - II

[Course Code ECS564MJ : Credit - 03]

As Per New Syllabus of NEP 2020 w.e.f. Academic Year 2024-25

# Dr. Vipin Y. Borole

M.Sc. (Information Technology), M.Phil. (Computer Science), Ph.D. (Computer Science)
Assistant Professor,
MET's Institute of Management, Bhujbal Knowledge City,
Adgaon, Nashik - 3.

# Mrs. Shubhangi Pushkar Phade

MCA (Engineering), MBA (HRM)
Assistant Professor,
MET's Institute of Management, Bhujbal Knowledge City,
Adgaon, Nashik - 3.

Price ₹ 110.00



N3378

#### **Essentials of Cloud Computing and Security (MCA Sem. II)**

ISBN 978-93-6993-373-0 First Edition **April, 2025** 

**Authors** 

The text of this publication, or any part thereof, should not be reproduced or transmitted in any form or stored in any computer storage system or device for distribution including photocopy, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc., without the written permission of Author with whom the rights are reserved. Breach of this condition is liable for legal action.

Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or discrepancy so noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the author or seller shall be responsible for any damage or loss of action to any one, of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

#### Published By: **NIRALI PRAKASHAN**

Abhyudaya Pragati, 1312, Shivaji Nagar, Off J.M. Road, Pune - 411005 Tel - (020) 25512336/37/39

Email: niralipune@pragationline.com

#### **Polyplate**

#### Printed By: **YOGIRAJ PRINTERS AND BINDERS**

Survey No. 10/1A, Ghule Industrial Estate Nanded Gaon Road Nanded, Pune - 411041

#### DISTRIBUTION CENTRES

#### **PUNE**

#### Nirali Prakashan

(For orders outside Pune)

S. No. 28/27, Dhayari Narhe Road, Near Asian College Pune 411041, Maharashtra Mobile: 9049672225

#### Nirali Prakashan

(For orders within Pune)

119, Budhwar Peth, Jogeshwari Mandir Lane Pune 411002, Maharashtra Mobile: 96577031450, 9890997937 Email: niralilocal@pragationline.com

## **MUMBAI**

Nirali Prakashan Rasdhara Co-op. Hsg. Society Ltd., 'D' Wing Ground Floor, 385 S.V.P. Road

> Girgaum, Mumbai 400004, Maharashtra Mobile: 7045821020, Tel: (022) 2385 6339 / 2386 9976 Email: mumbai@niralibooks.com

#### DISTRIBUTION BRANCHES

#### DELHI Nirali Prakashan

Room No. 2 Ground Floor 4575/15 Omkar Tower, Agarwal Road Darya Ganj, New Delhi 110002 Mobile: 9818561840 Email: delhi@niralibooks.com

#### **KOLHAPUR** Nirali Prakashan

438/2, Bhosale Plaza, Ground Floor Khasbag, Opp. Balgopal Talim Kolhapur 416 012 Maharashtra Mob: 9850046155

Email: kolhapur@niralibooks.com

### **BENGALURU**

## Nirali Prakashan

Maitri Ground Floor, Jaya Apartments, No. 99, 6<sup>th</sup> Cross, 6<sup>th</sup> Main, Malleswaram, Bengaluru 560003 Karnataka; Mob : 9686821074 Email: bengaluru@niralibooks.com

#### **JALGAON** Nirali Prakashan

34, V. V. Golani Market, Navi Peth, Jalgaon 425001, Maharashtra Tel: (0257) 222 0395

Mob: 94234 91860 Email: jalgaon@niralibooks.com

#### **NAGPUR** Nirali Prakashan

Above Maratha Mandir, Shop No. 3, First Floor, Rani Jhanshi Square, Sitabuldi Nagpur 440012 (MAH) Tel: (0712) 254 7129

Email: nagpur@niralibooks.com

#### **SOLAPUR** Nirali Prakashan

R-158/2, Avanti Nagar, Near Golden Gate, Pune Naka Chowk Solapur 413001, Maharashtra Mobile 9890918687

Email: solapur@niralibooks.com

For Order Enquiries: marketing@pragationline.com | www.niralibooks.com

Also find us on 

www.facebook.com/niralibooks

# Preface ...

We take an opportunity to present this Text Book on "Essentials of Cloud Computing Management and Security" to the students of MCA (Management), Semester-II as per the New Syllabus (Pattern 2024), The objective of this book is to present the subject matter in a most concise, compact, to the point and lucid manner.

The book covers theory of fundamental concepts of Cloud Software Security along with Cloud Programming Environments, knowledge on Emerging Trends in Cloud Computing and knowledge of Resource pooling, sharing and provisioning.

A special thanks to Dr. Nilesh Berad (Director, MET's Institute of Management, Bhujbal Knowledge City, Adgaon, Nashik-3 for showing full faith in us to write this text book.

We also thank Mrs. Anita Panajkar, Mr. Malik Shaikh and Ms. Chaitali Takle of M/s Nirali Prakashan for their excellent co-operation.

Although every care has been taken to check mistakes and misprints; any errors, omission and suggestions from teachers and students for the improvement of this text book shall be most welcome.

**Authors** 

# Syllabus ...

Unit	Contents	Weightage	Number of
No.		in %	Sessions
1.	Cloud Computing Software Security Fundamentals	20	9
	1.1 Cloud Information Security Objectives,		
	Confidentiality, Integrity, Availability 1.2 Security Services		
	1.3 Cloud Security Policy Implementation.		
	1.4 Infrastructure Security		
	1.5 Network-level security		
	1.6 Host level security		
	1.7 Data Security and Storage Cloud Access:		
	Authentication, Authorization and Accounting		
2.	Programming Environments	15	6
	2.1 Cloud and Grid Computing	_5	
	2.2 Programming support of google App Engine		
	2.3 Programming on Amazon AWS		
	2.4 Microsoft Azure		
3.	Emerging Trends in Cloud Computing	25	12
	3.1 Overview of Emerging Trends in Cloud		
	Computing		
	3.2 Multi-Cloud Environment		
	3.3 Omni Cloud		
	3.4 Blockchain Technology		
	3.5 Types of Blockchain Technology		
	3.6 Cloud AI		
	3.7 Edge Computing		
4.	Resource Pooling, Sharing and Provisioning	20	9
	4.1 Overview of Resource pooling		
	4.2 Commoditization of data center.		
	4.3 Standardization Automation and Optimization		
	4.4 Resource sharing.		
	4.5 Resource provisioning		
5.	Deploying Applications in Cloud Computing	20	9
	5.1 Introduction		
	5.2 Cloud Migration		
	5.3 Challenges and Benefits of Cloud Migration		
	5.4 Moving Applications to Cloud		
	5.5 Application Hosting in Azure		
	5.6 Google Cloud Applications		

# Contents ...

1.	Clo	ud Computing Software Security Fundamentals	1.1 - 1.18
	1.1	Introduction : Cloud Computing	1.1
		1.1.1 Definition	1.1
		1.1.2 Characteristics of Cloud Computing	1.1
		1.1.3 Deployment Models	1.2
	1.2	Cloud Information Security Objectives (CIA Triad)	1.2
	1.3	Security Services	1.4
		1.3.1 Key Pillars (Key Components) of Cloud Security Services	1.4
	1.4	Cloud Security Policy Implementation	1.5
	1.5	Infrastructure Security	1.8
		1.5.1 What is Infrastructure Security?	1.8
		1.5.2 Components of Infrastructure Security	1.8
	1.6	Network-Level Security	1.9
		1.6.1 What is Network-Level Security?	1.9
		1.6.2 Key Components of Network-Level Security	1.9
	1.7	Host Level Security	1.11
		1.7.1 What is Host-Level Security?	1.11
		1.7.2 Key Components of Host-Level Security	1.11
	1.8	Data Security and Storage Cloud Access :	
		Authentication, Authorization and Accounting	1.14
	•	Summary	1.16
	•	Exercise	1.17
2.	Pro	gramming Environments	2.1 - 2.10
	2.1	Cloud and Grid Computing	2.1
		2.1.1 Cloud Computing	2.1
		2.1.2 Grid Computing	2.2
		2.1.3 Cloud Computing vs. Grid Computing	2.3
	2.2	Programming Support of Google App Engine (GAE)	2.4
		2.2.1 Definition	2.4
		2.2.2 Key Features	2.4
	2.3	Programming on Amazon Web Services (AWS)	2.5
		2.3.1 Programming Support	2.5
		2.3.2 AWS Setup Procedure	2.5
	2.4	Microsoft Azure	2.7
		2.4.1 Programming Support	2.7
		2.4.2 Microsoft Azure Set Up Procedure	2.7
	•	Exercise	2 9

3.	Em	erging Trends in Cloud Computing 3	3.1 - 3.18
		Overview of Emerging Trends in Cloud Computing	3.1
		3.1.1 What are Emerging Trends in Cloud Computing?	3.1
		3.1.2 Why are Emerging Trends important?	3.1
		3.1.3 Examples of Emerging Trends in Cloud Computing	3.2
		3.1.4 Simple Example of an Emerging Trend in	
		Cloud Computing for College Students	3.2
		3.1.5 Benefits of Cloud-Based Learning	3.2
	3.2	Multi-Cloud Environment	3.2
		3.2.1 Definition of Multi-cloud	3.2
		3.2.2 Why Use a Multi-cloud Strategy?	3.3
		3.2.3 Multi-cloud Architecture	3.3
		3.2.4 Real-Life Example of Multi-cloud	3.4
		3.2.5 Advantages of Using Multi-Cloud Strategy	3.5
		3.2.6 Disadvantages of using Multi-Cloud Strategy	3.5
	3.3	Omni Cloud	3.5
		3.3.1 What is Omni Cloud?	3.5
		3.3.2 How Omni Cloud Works?	3.5
		3.3.3 Key Benefits of Omni Cloud	3.5
		3.3.4 Real-Life Example: Global Banking System	3.6
	3.4	Blockchain Technology	3.6
		3.4.1 Definition	3.6
		3.4.2 How Blockchain Fits into Cloud Computing?	3.6
		3.4.3 Benefits of using Blockchain in Cloud Computing	3.6
		3.4.4 Major Players Combining Blockchain with Cloud	3.7
		3.4.5 Key Components of Blockchain	3.7
		3.4.6 How does Blockchain Work?	3.7
		3.4.7 Types of Blockchain Technology	3.8
		3.4.8 Applications of Blockchain Technology	3.9
		3.4.9 Advantages of Blockchain Technology	3.10
		3.4.10Disadvantages of Blockchain Technology	3.10
	3.5	Cloud Al	3.11
		3.5.1 Definition	3.11
		3.5.2 Key Features of Cloud Al	3.11
		3.5.3 Popular Cloud AI Platforms and Their Services	3.11
		3.5.4 Applications of Cloud Al	3.12
		3.5.5 Real life example on Cloud Al	3.12
	3.6	Edge Computing	3.12
		3.6.1 Definition	3.12
		3.6.2 Applications of Edge Computing	3.12
		3.6.3 Key Aspects of Edge Computing	3.13
		3.6.4 How Does Edge Computing Work?	3.13
		3.6.5 Edge Computing Architecture	3.13
		3.6.6 Example Use Cases	3.14
		3.6.7 Edge Computing vs Cloud Computing: Differences and Relationship	р 3.14
		3.6.8 When to use Edge Computing?	3.15
	•	Summary	3.15
	•	Exercise	3.16

4.	Res	source Pooling, Sharing and Provisioning	4.1 - 4.14
	4.1	Overview of Resource Pooling	4.1
		4.1.1 Definition of Resource Pooling	4.2
		4.1.2 Key Characteristics of Resource Pooling	4.2
		4.1.3 Components of Resource Pooling	4.2
		4.1.4 Benefits of Resource Pooling	4.2
		4.1.5 Challenges of Resource Pooling	4.2
		4.1.6 Real-Life Example of Resource Pooling in Cloud Computing	4.4
		4.1.7 Types of Resource Pooling in Cloud Computing	4.4
		4.1.8 Resource Pooling Architecture	4.6
	4.2	Commoditization of Data Center	4.7
	4.3	Standardization, Automation and Optimization	4.7
		4.3.1 Resource Sharing V/S Resource Pooling	4.9
	4.4	Resource Sharing	4.10
		4.4.1 Types of Shared Resources in Cloud Computing	4.10
		4.4.2 How Resource Sharing Works in Cloud Computing?	4.10
		4.4.3 Real-Life Examples of Resource Sharing in Cloud Computing	4.11
		4.4.4 Advantages of Resource Sharing in Cloud Computing	4.11
	4.5	Resource Provisioning	4.11
		4.5.1 Cloud Resource Provisioning Models	4.11
		4.5.2 Types of Resource Provisioning in Cloud Computing	4.12
		4.5.3 Best Practices for Efficient Resource Provisioning	4.12
		4.5.4 Challenges of Cloud Provisioning	4.13
	•	Summary	4.13
	•	Exercise	4.13
5.	Dep	ploying Applications in Cloud Computing	5.1 - 5.10
	5.1	Introduction to Deploying Applications in Cloud Computing	5.1
		5.1.1 What is Cloud Application Deployment?	5.1
		5.1.2 Why Deploy Applications in the Cloud?	5.2
		5.1.3 Common Cloud Services for Application Deployment	5.2
		5.1.4 Example of Cloud Application Deployment	5.2
	5.2	Cloud Migration	5.3
		5.2.1 Definition	5.3
		5.2.2 Types of Cloud Migration (6 R's)	5.3
		5.2.3 Cloud Migration Process (Step-by-Step Guide)	5.5
		5.2.4 Real-Life Examples of Cloud Migration	5.5
		5.2.5 Benefits of Cloud Migration	5.6
		5.2.6 Challenges of Cloud Migration	5.7
		5.2.7 Real-Time Cloud Migration Challenges and Solutions	5.8
	5.3	Moving Applications to Cloud	5.8
		5.3.1 Key Steps in Moving Applications to the Cloud	5.8
		5.3.2 Real-Life Examples	5.8
		5.3.3 Benefits of Moving Applications to Cloud	5.9
		5.3.4 Challenges	5.9
	5.4		5.9
	•	Summary	5.10
	•	Exercise	5.10