

Academic Council: 26/07/2019

Item No: 4.76

UNIVERSITY OF MUMBAI



Syllabus for M.Sc. Part I
(Semester I and II)

Programme: M.Sc.

Subject: Information Technology

(Choice Based Credit System with effect from
the academic year 2019 – 2020)

Semester – I		
Course Code	Course Title	Credits
PSIT101	Research in Computing	4
PSIT102	Data Science	4
PSIT103	Cloud Computing	4
PSIT104	Soft Computing Techniques	4
PSIT1P1	Research in Computing Practical	2
PSIT1P2	Data Science Practical	2
PSIT1P3	Cloud Computing Practical	2
PSIT1P4	Soft Computing Techniques Practical	2
Total Credits		24

Semester – II		
Course Code	Course Title	Credits
PSIT201	Big Data Analytics	4
PSIT202	Modern Networking	4
PSIT203	Microservices Architecture	4
PSIT204	Image Processing	4
PSIT2P1	Big Data Analytics Practical	2
PSIT2P2	Modern Networking Practical	2
PSIT2P3	Microservices Architecture Practical	2
PSIT2P4	Image Processing Practical	2
Total Credits		24

Program Specific Outcomes

PSO1: Ability to apply the knowledge of Information Technology with recent trends aligned with research and industry.

PSO2: Ability to apply IT in the field of Computational Research, Soft Computing, Big Data Analytics, Data Science, Image Processing, Artificial Intelligence, Networking and Cloud Computing.

PSO3: Ability to provide socially acceptable technical solutions in the domains of Information Security, Machine Learning, Internet of Things and Embedded System, Infrastructure Services as specializations.

PSO4: Ability to apply the knowledge of Intellectual Property Rights, Cyber Laws and Cyber Forensics and various standards in interest of National Security and Integrity along with IT Industry.

PSO5: Ability to write effective project reports, research publications and content development and to work in multidisciplinary environment in the context of changing technologies.

M. Sc (Information Technology)		Semester – I	
Course Name: Cloud Computing		Course Code: PSIT103	
Periods per week 1 Period is 60 minutes	Lectures	4	
	Credits	4	
		Hours	Marks
Evaluation System	Theory Examination	2½	60
	Theory Internal	--	40

Objectives	<input type="checkbox"/> To learn how to use Cloud Services. <input type="checkbox"/> To implement Virtualization. <input type="checkbox"/> To implement Task Scheduling algorithms. <input type="checkbox"/> Apply Map-Reduce concept to applications. <input type="checkbox"/> To build Private Cloud. <input type="checkbox"/> Broadly educate to know the impact of engineering on legal and societal issues involved.
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Unit	Details	Lectures
I	Introduction to Cloud Computing: Introduction, Historical developments, Building Cloud Computing Environments, Principles of Parallel and Distributed Computing: Eras of Computing, Parallel v/s distributed computing, Elements of Parallel Computing, Elements of distributed computing, Technologies for distributed computing. Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples. Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud usage monitor, Resource replication, Ready-made environment.	12
II	Cloud Computing Architecture: Introduction, Fundamental concepts and models, Roles and boundaries, Cloud Characteristics, Cloud Delivery models, Cloud Deployment models, Economics of the cloud, Open challenges. Fundamental Cloud Security: Basics, Threat agents, Cloud security threats, additional considerations. Industrial Platforms and New Developments: Amazon Web Services, Google App Engine, Microsoft Azure.	12
III	Specialized Cloud Mechanisms: Automated Scaling listener, Load Balancer, SLA monitor, Pay-per-use monitor, Audit monitor, fail over system, Hypervisor, Resource Centre, Multidevice broker, State Management Database. Cloud Management Mechanisms: Remote administration system, Resource Management System, SLA Management System, Billing Management System, Cloud Security Mechanisms: Encryption, Hashing, Digital Signature, Public Key Infrastructure (PKI), Identity and Access Management (IAM), Single	12

	Sign-On (SSO), Cloud-Based Security Groups, Hardened Virtual Server Images	
IV	Fundamental Cloud Architectures: Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Architecture, Redundant Storage Architecture. Advanced Cloud Architectures: Hypervisor Clustering Architecture, Load Balanced Virtual Server Instances Architecture, Non-Disruptive Service Relocation Architecture, Zero Downtime Architecture, Cloud Balancing Architecture, Resource Reservation Architecture, Dynamic Failure Detection and Recovery Architecture, Bare-Metal Provisioning Architecture, Rapid Provisioning Architecture, Storage Workload Management Architecture	12
V	Cloud Delivery Model Considerations: Cloud Delivery Models: The Cloud Provider Perspective, Cloud Delivery Models: The Cloud Consumer Perspective, Cost Metrics and Pricing Models: Business Cost Metrics, Cloud Usage Cost Metrics, Cost Management Considerations, Service Quality Metrics and SLAs: Service Quality Metrics, SLA Guidelines	12

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Mastering Cloud Computing Foundations and Applications Programming	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi	Elsevier	-	2013
2.	Cloud Computing Concepts, Technology & Architecture	Thomas Erl, Zaigham Mahmood, and Ricardo Puttini	Prentice Hall	-	2013
3.	Distributed and Cloud Computing, From Parallel Processing to the Internet of Things	Kai Hwang, Jack Dongarra, Geoffrey Fox	MK Publishers	--	2012

Evaluation Scheme

Internal Evaluation (40 Marks)

The internal assessment marks shall be awarded as follows:

1. 30 marks (Any one of the following):
 - a. Written Test or
 - b. SWAYAM (Advanced Course) of minimum 20 hours and certification exam completed or
 - c. NPTEL (Advanced Course) of minimum 20 hours and certification exam completed or
 - d. Valid International Certifications (Prometric, Pearson, Certiport, Coursera, Udemty and the like)
 - e. One certification marks shall be awarded one course only. For four courses, the students will have to complete four certifications.

2. 10 marks

The marks given out of 40 for publishing the research paper should be divided into four course and should awarded out of 10 in each of the four course.

i. Suggested format of Question paper of 30 marks for the written test.

Q1.	Attempt <u>any two</u> of the following:	16
a.		
b.		
c.		
d.		
Q2.	Attempt <u>any two</u> of the following:	14
a.		
b.		
c.		
d.		

- ii. 10 marks from every course coming to a total of 40 marks, shall be awarded on publishing of research paper in UGC approved Journal with plagiarism less than 10%. The marks can be awarded as per the impact factor of the journal, quality of the paper, importance of the contents published, social value.

External Examination: (60 marks)

	All questions are compulsory	
Q1	(Based on Unit 1) Attempt <u>any two</u> of the following:	12
a.		
b.		
c.		
d.		
Q2	(Based on Unit 2) Attempt <u>any two</u> of the following:	12
Q3	(Based on Unit 3) Attempt <u>any two</u> of the following:	12
Q4	(Based on Unit 4) Attempt <u>any two</u> of the following:	12
Q5	(Based on Unit 5) Attempt <u>any two</u> of the following:	12

Practical Evaluation (50 marks)

A Certified copy journal is essential to appear for the practical examination.

1.	Practical Question 1	20
2.	Practical Question 2	20
3.	Journal	5
4.	Viva Voce	5

OR

1.	Practical Question	40
2.	Journal	5
3.	Viva Voce	5