Academic Council _____
Item No: 4.100

University Of Mumbai

Syllabus for M.Sc. I.T. Part II
Semester III and IV
Programme: M.Sc.
Subject: Information Technology
CHOICE BASED(REVISED)
with effect from the academic year
2020 – 2021

Artificial Intelligence Track
Image Processing Track
Cloud Computing Track
Security Track

SEMESTER - III					
	Course Title				
Course Code	Theory	Credits	Course Code	Practical	Credits
PSIT301	Technical Writing and Entrepreneurship Development	4	PSIT3P1	Project Documentation and Viva	2
Elective 1: Select Any one from the courses listed below along with corresponding practical course					
PSIT302a	Applied Artificial Intelligence	4	PSIT3P2a	Applied Artificial Intelligence Practical	2
PSIT302b	Computer Vision		PSIT3P2b	Computer Vision Practical	
PSIT302c	Cloud Application Development		PSIT3P2c	Cloud Application Development Practical	
PSIT302d	Security Breaches and Countermeasures		PSIT3P2d	Security Breaches and Countermeasures Practical	
Elective 2: Select Any one from the courses listed below along with corresponding practical course					
PSIT303a	Machine Learning	4	PSIT3P3a	Machine Learning Practical	2
PSIT303b	Biomedical Image Processing		PSIT3P3b	Biomedical Image Processing Practical	
PSIT303c	Cloud Management		PSIT3P3c	Cloud Management Practical	
PSIT303d	Malware Analysis		PSIT3P3d	Malware Analysis Practical	
Elective 3: Select Any one from the courses listed below along with corresponding practical course					
PSIT304a	Robotic Process Automation	4	PSIT3P4a	Robotic Process Automation Practical	2
PSIT304b	Virtual Reality and Augmented Reality		PSIT3P4b	Virtual Reality and Augmented Reality Practical	
PSIT304c	Data Center Technologies		PSIT3P4c	Data Center Technologies Practical	
PSIT304d	Offensive Security		PSIT3P4d	Offensive Security Practical	
	Total Theory Credits	**16**		Total Practical Credits	**8**
Total Credits for Semester III: 24					

SEMESTER - IV					
	Course Title				
Course Code	Theory	Credits	Course Code	Practical	Credits
PSIT401	Blockchain	4	PSIT4P1		2
Elective 1: Select Any one from the courses listed below along with corresponding practical course					
PSIT402a	Natural Language Processing	4	PSIT4P2a	Natural Language Processing Practical	2
PSIT402b	Digital Image Forensics		PSIT4P2b	Digital Image Forensics Practical	
PSIT402c	Advanced IoT		PSIT4P2c	Advanced IoT Practical	
PSIT402d	Cyber Forensics		PSIT4P2d	Cyber Forensics Practical	
Elective 2: Select Any one from the courses listed below along with corresponding practical course					
PSIT403a	Deep Learning	4	PSIT4P3a	Deep Learning Practical	2
PSIT403b	Remote Sensing		PSIT4P3b	Remote Sensing Practical	
PSIT403c	Server Virtualization on VMWare Platform		PSIT4P3c	Server Virtualization on VMWare Platform Practical	
PSIT403d	Security Operations Center		PSIT4P3d	Security Operations Center Practical	
Elective 3: Select Any one from the courses listed below. Project Implementation and Viva is compulsory					
PSIT404a	Human Computer Interaction	4	PSIT4P4	Project Implementation and Viva	2
PSIT404b	Advanced Applications of Image Processing				
PSIT404c	Storage as a Service				
PSIT404d	Information Security Auditing				
	Total Theory Credits	**16**		Total Practical Credits	**8**
Total Credits for Semester IV: 24					

If a student selects all 6 papers of Artificial Intelligence Track, he should be awarded the degree **M.Sc. (Information Technology), Artificial Intelligence Specialisation.**
If a student selects all 6 papers of Image Processing Track, he should be awarded the degree **M.Sc. (Information Technology), Image Processing Specialisation.**
If a student selects all 6 papers of Cloud Computing Track, he should be awarded the degree **M.Sc. (Information Technology), Cloud Computing Specialisation**
If a student selects all 6 papers of Artificial Security Track, he should be awarded the degree **M.Sc. (Information Technology), Security Specialisation**
All other students will be awarded M.Sc. (Information Technology) degree.

SEMESTER III

PSIT302c: Cloud Application Development

M. Sc (Information Technology)		Semester – III	
Course Name: Cloud Application Development		**Course Code: PSIT302c**	
Periods per week (1 Period is 60 minutes)		4	
Credits		4	
		Hours	**Marks**
Evaluation System	**Theory Examination**	2½	60
	Internal	--	40

Course Objectives:

- To develop and deploy Microservices for cloud
- To understand Kubernetes and deploy applications on Azure Kubernetes Service
- To understand DevOps for Azure
- To follow the DevOps practices for software development
- To build APIs for Azure and AWS

Unit	Details	Lectures	Outcomes
I	**Implementing Microservices:** Client to microservices communication, Interservice communication, data considerations, security, monitoring, microservices hosting platform options. **Azure Service Fabric:** Introduction, core concepts, supported programming models, service fabric clusters, develop and deploy applications of service fabric. **Monitoring Azure Service Fabric Clusters:** Azure application, resource manager template, Adding Application Monitoring to a Stateless Service Using Application Insights, Cluster monitoring, Infrastructure monitoring.	**12**	**CO1**
II	**Azure Kubernetes Service (AKS):** Introduction to kubernetes and AKS, AKS development tools, Deploy applications on AKS. **Monitoring AKS:** Monitoring, Azure monitor and analytics, monitoring AKS clusters, native kubernetes dashboard, Prometheus and Grafana. **Securing Microservices:** Authentication in microservices, Implenting security using API gateway pattern, Creating application using Ocrlot and securing APIs with Azure AD. **Database Design for Microservices:** Data stores, monolithic approach, Microservices approach, harnessing cloud computing, dataase options on MS Azure, overcoming application development challenges. **Building Microservices on Azure Stack:** Azure stack, Offering IaaS, PaaS on-premises simplified, SaaS on Azure stack.	**12**	**CO2**

III	.**NET DevOps for Azure:** DevOps introduction, Problem and solution. **Professional Grade DevOps Environment:** The state of DevOps, professional grade DevOps vision, DevOps architecture, tools for professional DevOps environment, DevOps centered application. **Tracking work:** Process template, Types of work items, Customizing the process, Working with the process. **Tracking code:** Number of repositories, Git repository, structure, branching pattern, Azure repos configuration, Git and Azure.	**12**	**CO3**
IV	**Building the code:** Structure of build, using builds with .NET core and Azure pipelines, **Validating the code:** Strategy for defect detection, Implementing defect detection. **Release candidate creation:** Designing release candidate architecture, Azure artifacts workflow for release candidates, **Deploying the release:** Designing deployment pipeline, Implementing deployment in Azure pipelines. **Operating and monitoring release:** Principles, Architectures for observability, Jumpstarting observability.	**12**	**CO4**
V	**Introduction to APIs:** Introduction, API economy, APIs in public sector. **API Strategy and Architecture:** API Strategy, API value chain, API architecture, **API** management. **API Development:** Considerations, Standards, kick-start API development, team orientation. **API Gateways:** API Gateways in public cloud, Azure API management, AWS API gateway. **API Security:** Request-based security, Authentication and authorization.	**12**	**CO5**

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Building Microservices Applications on Microsoft Azure- Designing, Developing, Deploying, and Monitoring	Harsh Chawla Hemant Kathuria	Apress	--	2019
2.	.NET DevOps for Azure A Developer's Guide to DevOps Architecture the Right Way	Jeffrey Palermo	Apress	--	2019
3.	Practical API Architecture and Development with Azure and AWS - Design and Implementation of APIs for the Cloud	Thurupathan Vijayakumar	Apress	--	2018

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, Udemy 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 (30 in Semester 4) 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 *any two* of the following:**	**16**
a.		
b.		
c.		
d.		
Q2.	**Attempt *any two* 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 / Other 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 *any two* of the following:**	**12**
a.		
b.		
c.		
d.		
Q2	(Based on Unit 2) Attempt any two of the following:	12
Q3	(Based on Unit 3) Attempt any two of the following:	12
Q4	(Based on Unit 4) Attempt any two of the following:	12
Q5	(Based on Unit 5) Attempt any two of the following:	12