Semester: 2	
Programme: M.Sc. Computer Science	
Course: Cloud Computing & Tools for Business Analytics	
Paper code:	**Credits: 6**
Hours/week: Theory: 3 / Practical: 2	
Category: Core/MDC/SEC/VAC: Core	
Theory / Practical / Composite: Composite	
No of modules: 1	

Course Overview: This course introduces the fundamentals of Cloud Computing, including cloud architectures, enabling technologies, virtualization, deployment and service models, cloud platforms, and security concepts. It also develops practical skills in data analysis using Microsoft Excel and business intelligence tools such as Power BI and Tableau, covering data transformation, modeling, visualization, and dashboard design. The course equips students to analyze business data, build interactive reports, and leverage cloud technologies for data-driven decision-making and modern enterprise applications.

Course Outcome:

Cloud Computing

1. **Recall** the fundamental concepts, characteristics, advantages, disadvantages, applications, and terminology of Cloud Computing.
2. **Explain** cloud-enabling technologies, virtualization concepts, and cloud deployment and service models.
3. **Apply** virtualization techniques and appropriate cloud deployment and service models to address different computing requirements.
4. **Analyze** cloud architectures, deployment models, and cloud platforms to determine suitable solutions for various application scenarios.
5. **Evaluate** the features, services, and security aspects of cloud platforms such as Amazon Web Services (AWS) and Google Cloud Platform (GCP), and recommend appropriate security measures against cloud threats.
6. **Design** cloud-based solutions by integrating suitable cloud technologies, deployment models, service models, and security mechanisms to meet organizational requirements.

Tools for Business Analytics

1. **Recall** the fundamental concepts, features, and functions of Microsoft Excel, Power BI, and Tableau used in data analysis and visualization.
2. **Explain** data cleansing, data transformation, financial modelling, and reporting techniques using spreadsheet and business intelligence tools.
3. **Apply** advanced Excel formulas, Power Query, data modeling techniques, and DAX functions to process and analyze business data.
4. **Analyze** datasets using Pivot Tables, Pivot Charts, data models, and interactive visualizations to derive meaningful business insights.
5. **Evaluate** business performance using key performance indicators (KPIs), forecasting techniques, dashboards, and executive reports to support decision-making.
6. **Design** and develop interactive business intelligence dashboards and reporting solutions using Microsoft Excel, Power BI, and Tableau.

Prerequisites: None

SYLLABUS (Cloud Computing)

UNIT/Module	CONTENT	NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I.	Cloud Computing Basics: definition; characteristics; advantages; disadvantages; applications.	**5**	**CO1**	**K1, K2 (Remember/Understand)**
II.	Cloud-enabling technologies: Client / Server model; Distributed Computing; Grid Computing; Utility Computing;	**4**	**CO2**	**K2 (Understand)**
III.	Virtualization: benefits & drawbacks of virtualization; hypervisor; load balancing; resource virtualization.	**6**	**CO2, CO3**	**K2, K3 (Understand/Apply)**
IV.	Cloud Deployment Models: public cloud; private cloud; hybrid cloud; community cloud.	**6**	**CO3, CO4**	**K3, K4 (Apply/Analyze)**
V.	Cloud Service Models: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Identity-as-a-Service (IDaaS).	**6**	**CO3, CO4**	**K3, K4 (Apply/Analyze)**
VI.	Cloud Solutions: Amazon Web Services (AWS),	**5**	**CO4, CO5**	**K4, K5 (Analyze/Evaluate)**

	Google Cloud Platform (GCP).			
VII.	Cloud Security: threats; attacks; remedies	**7**	**CO5, CO6**	**K5, K6 (Evaluate/Create)**
Practical: SYLLABUS (BA Tools)				
UNIT/Module	**CONTENT**	**NUMBER OF CLASSES**	**CO Mapping**	**COGNITIVE LEVEL**
I.	**Data Analysis using MS EXCEL:** Advanced Formulas: IF, SUMIFS, VLOOKUP, and XLOOKUP. Data Cleansing: Handling missing values, removing duplicates, and text-to-columns. Management Reporting: Building Pivot Tables and Pivot Charts for KPIs. Financial Modelling: MoM/YoY growth analysis, break-even analysis, and forecasting trends.	**9**	**CO2, CO3, CO4**	**K2, K3, K4 (Understand/Apply/Analyze)**
II.	**Data Visualization with Power BI & Tableau:** Data Extraction & Transformation: Connecting to data sources and using Power Query. Data Modeling: Creating relationships across multiple tables (Star/Snowflake schema).	**17**	**CO3, CO4, CO5, CO6**	**K3, K4, K5, K6 (Apply/Analyze/Evaluate/Create)**

	DAX & Calculations: Writing basic DAX formulas (measures and calculated columns) for KPIs. Dashboard Design: Designing interactive charts, slicers, and executive-level reports.			

Text Books
1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill
2. Cloud Computing: Concepts, Technology & Architecture (The Pearson Service Technology Series from Thomas Erl) by Thomas Erl, Ricardo Puttini, Zaigham Mahmood
3. Mastering Advanced Excel, Ritu Arora, BPB
4. Mastering Power BI, Chandraish Sinha, BPB
5. Mastering Data Visualization using Tableau, Seema Acharya, Wiley
Web Resources
1. Cloud Computing, Prof. Soumya Kanti Ghosh, https://nptel.ac.in/courses/106105167
2. Decision making with EXCEL, Prof. Ramesh Anbanandam, https://nptel.ac.in/courses/110107157
3. Data Analytics and Visualization with MS Power BI, Dr. Anand A. Kopare, https://onlinecourses.swayam2.ac.in/e-learning/preview/imb25_mg218
4. Learn Tableau, https://www.tableau.com/learn

Evaluation	**Theory** **CIA: 10** **Semester Exam: 50**	**Practical** **CA: 40**
Paper Structure for Theory Semester Exam	Short questions: 5 marks each; 2 out of 4	Long questions: 10 marks each; 4 out of 6

Course outcomes (COs) and Cognitive Level Mapping

Cloud Computing

COs	**CO Description**	**Cognitive levels**
CO1	Recall the fundamental concepts, characteristics, advantages, disadvantages, applications, and terminology of Cloud Computing.	K1–K2 (Remember/Understand)
CO2	Explain cloud-enabling technologies, virtualization concepts, and cloud deployment and service models.	K2 (Understand)
CO3	Apply virtualization techniques and appropriate cloud deployment and service models to address different computing requirements.	K3 (Apply)

CO4	Analyze cloud architectures, deployment models, and cloud platforms to determine suitable solutions for various application scenarios.	K4 (Analyze)
CO5	Evaluate the features, services, and security aspects of AWS and GCP, and recommend appropriate security measures against cloud threats.	K5 (Evaluate)
CO6	Design cloud-based solutions by integrating suitable cloud technologies, deployment models, service models, and security mechanisms to meet organizational requirements.	K6 (Create)

Course outcomes (COs) and Cognitive Level Mapping

BA Tools

COs	**CO Description**	**Cognitive levels**
CO1	Recall the fundamental concepts, features, and functions of Microsoft Excel, Power BI, and Tableau used in data analysis and visualization.	K1–K2 (Remember/Understand)
CO2	Explain data cleansing, data transformation, financial modelling, and reporting techniques using spreadsheet and business intelligence tools.	K2 (Understand)
CO3	Apply advanced Excel formulas, Power Query, data modeling techniques, and DAX functions to process and analyze business data.	K3 (Apply)
CO4	Analyze datasets using Pivot Tables, Pivot Charts, data models, and interactive visualizations to derive meaningful business insights.	K4 (Analyze)
CO5	Evaluate business performance using key performance indicators (KPIs), forecasting techniques, dashboards, and executive reports to support data-driven decision-making.	K5 (Evaluate)
CO6	Design and develop interactive business intelligence dashboards and reporting solutions using Microsoft Excel, Power BI, and Tableau.	K6 (Create)