# Scheme & Syllabus of UNDERGRADUATE DEGREE COURSE B.Tech. VII & VIII Semester Machine Learning and Computing



## Bikaner Technical University, Bikaner Effective from session: 2021 – 2022



#### Teaching & Examination Scheme B.Tech.: Machine Learning & Computing 4<sup>th</sup> Year - VII Semester

	THEORY										
		Course		Contact							
SN	Category			hrs/week			Marks				Cr
		Code	Title				Exa				
				L	Т	Р	m	IA	ETE	Total	
							Hrs				
1	PCC	7ML4-01	Big Data Analytics	3	0	0	3	30	120	150	3
2	OE		Open Elective – I	3	0	0	3	30	120	150	3
		Sub Total		6	0	0	6	60	240	300	6
PRACTICAL & SE			SESS	ION	IAL		•	•			
3	DCC	7ML4-21	Big Data Analytics Lab	0	0	4	2	60	40	100	2
4	rcc	7ML4-22	Data Visualization Lab	0	0	4	2	60	40	100	2
5	PSIT	7ML7-30	Industrial Training	1	0	0				125	2.5
6	PSIT	7ML7-40	Seminar	2	0	0				100	2
7	SODE CA	7ML8-00	Social Outreach, Discipline & Extra-Curricular Activities						25	25	0.5
		Sub- Total		3	0	8	4	120	80	450	9
		TOTA	AL OF VII SEMESTER	9	0	8	10	180	320	750	15

L: Lecture, T: Tutorial, P: Practical, Cr: Credits

ETE: End Term Exam, IA: Internal Assessment



## BIKANER TECHNICAL UNIVERSITY, BIKANER Scheme & Syllabus

IV Year- VII & VIII Semester: B. Tech. MLC

#### Teaching & Examination Scheme B.Tech.: Machine Learning & Computing 4<sup>th</sup> Year - VIII Semester

	THEORY										
		ory Course		Contact hrs/week			Marks				
SN	Category										Cr
		Code	Title				Exa				
				L	T	Р	m Hrs	IA	ETE	Total	
1	PCC/PEC	8ML4-01	Time Series Analysis and Forecasting	3	0	0	3	30	120	150	3
2	OE		Open Elective – I	3	0	0	3	30	120	150	3
		Sub Total		6	0	0	6	60	240	300	6
	PRACTICAL & SESSIONAL										
3	PCC	8ML4-21	Time Series Analysis and Forecasting Lab	0	0	2	2	30	20	50	1
4	-	8ML4-22	Cyber Security Lab	0	0	2	2	30	20	50	1
5	PSIT	8ML7-0	Project	3	0	0		210	140	350	7
7	SODE CA	8ML8-00	Social Outreach, Discipline & Extra-Curricular Activities						25	25	0.5
		Sub- Total		3	0	4	4	270	205	475	9.5
		ТОТА	L OF VIII SEMESTER	9	0	4	10	330	445	775	15.5

L: Lecture, T: Tutorial, P: Practical, Cr: Credits

ETE: End Term Exam, IA: Internal Assessment



List of Open Electives for Machine Learning and Computing					
Subject Code	Title		Subject Code	Title	
	Open Elective - I			Open Elective - II	
7AG6-60.1	Human Engineering and Safety		8AG6-60.1	Energy Management	
7AG6-60.2	Environmental Engineering and Disaster Management		8AG6-60.2	Waste and By-product Utilization	
7AN6-60.1	Aircraft Avionic System		8AN6-60.1	Finite Element Methods	
7AN6-60.2	Non-Destructive Testing		8AN6-60.2	Factor of Human Interactions	
7CH6-60.1	Optimization Techniques		8CH6-60.1	Refinery Engineering Design	
7CH6-60.2	Sustainable Engineering		8CH6-60.2	Fertilizer Technology	
7CR6-60.1	Introduction to Ceramic Science & Technology		8CR6-60.1	Electrical and Electronic Ceramics	
7CR6-60.2	Plant, Equipment and Furnace Design		8CR6-60.2	Biomaterials	
7CE6-60.1	Environmental Impact Analysis		8CE6-60.1	Composite Materials	
7CE6-60.2	Disaster Management		8CE6-60.2	Fire and Safety Engineering	
7EE6-60.1	Electrical Machines and Drives		8EE6-60.1	Energy Audit and Demand side Management	
7EE6-60.2	Power Generation Sources.		8EE6-60.2	Soft Computing	
7EC6-60.1	Principle of Electronic communication		8EC6-60.1	Industrial and Biomedical applications of RF Energy	
7EC6-60.2	Micro and Smart System Technology		8EC6-60.2	Robotics and control	
7ME6-60.1	Finite Element Analysis		8ME6-60.1	Operations Research	
7ME6-60.2	Quality Management		8ME6-60.2	Simulation Modeling and Analysis	
7MI6-60.1	Rock Engineering		8MI6-60.1	Experimental Stress Analysis	
7MI6-60.2	Mineral Processing		8MI6-60.2	Maintenance Management	
7PE6-60.1	Pipeline Engineering		8PE6-60.1	Unconventional Hydrocarbon Resources	
7PE6-60.2	Water Pollution control Engineering		8PE6-60.2	Energy Management & Policy	
7TT6-60.1	Technical Textiles		8TT6-60.1	Material and Human Resource Management	
7TT6-60.2	Garment Manufacturing Technology		8TT6-60.2	Disaster Management	



## 7ML4-01: Big Data Analytics

Credit: 3	Max Marks: 150 (IA :30, ETE:120)		
3L+ 0T+ 0P	End Term Exams: 3 hr		

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	01
2	<b>Introduction to Big Data:</b> Big data features and challenges, Problems with Traditional Large-Scale System, Sources of Big Data, 3 V's of Big Data, Types of Data. Working with Big Data: Google File System. Hadoop Distributed File System (HDFS) - Building blocks of Hadoop (Name node. Data node. Secondary Name node. Job Tracker. Task Tracker), Introducing and Configuring Hadoop cluster (Local. Pseudo- distributed mode, Fully Distributed mode). Configuring XML files.	10
3	<b>Writing MapReduce Programs:</b> A Weather Dataset. Understanding Hadoop API for MapReduce Framework (Old and New). Basic programs of Hadoop MapReduce: Driver code. Mappercode, Reducer code. Record Reader, Combiner, Partitioner.	08
4	<b>Hadoop I/O:</b> The Writable Interface. Writable Comparable and comparators. Writable Classes: Writable wrappers for Java primitives. Text. Bytes Writable. Null Writable, Object Writable and Generic Writable. Writable collections. Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators.	08
5	<b>Pig:</b> Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow. Working through the ABCs of Pig Latin. Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.	07
6	<b>Applying Structure to Hadoop Data with Hive:</b> Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive. Examining the Hive Clients. Working with Hive Data Types. Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.	06
	Total	40



## 7ML4-21: Big Data Analytics Lab

Credit: 2	Max Marks: 100 (IA :60, ETE:40)
0L+ 0T+ 4P	End Term Exams: 2 hr

SN	List of Experiments				
1	Implement the following Data structures in Javai) Linked Listsii) Stacksiii) Queuesiv) Setv) Map				
2	Perform setting up and Installing Hadoop in its three operating modes:Standalone, Pseudo distributed, fully distributed.				
3	<ul> <li>Implement the following file management tasks in Hadoop:</li> <li>Adding files and directories</li> <li>Retrieving files</li> <li>Deleting files Hint: A typical Hadoop workflow creates data files (suchas log files) elsewhere and copies them into HDFS using one of theabove command line utilities.</li> </ul>				
4	Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.				
5	Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.				
6	Implement Matrix Multiplication with Hadoop Map Reduce				
7	Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.				
8	Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.				
9	Solve some real-life big data problems.				



## 7ML4-22: Data Visualization Lab

Credit: 2	Max Marks: 100 (IA :60, ETE:40)
0L+ 0T+ 4P	End Term Exams: 2 hr

SN	List of Experiments
1	Learn how to import data from various sources such as SQL database, CSV, XML,
	ALSA into plot variables in python.
2	Study various data visualization library of python such as Matplotlib, Seaborn, plotly
2	etc.
2	Use standard datasets and draw Scatter plot, line chart, bar chart, histogram, heatmap,
3	using different python libraries
4	Use different data visualization techniques to filter the data.
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5	Use different data visualization techniques to transform the data.
6	Use multiple data source to draw various visualization patterns.
7	Construct Time Series alignetics France alexabet
/	Create a Time Series visualization For a sales dataset.
0	
ð	Create a trend line with a confidence band in any suitable dataset.
9	Show an example of Skewed data and removal of skewedness using data visualization
	techniques.



## 8ML4-01: Time Series Analysis and Forecasting

Credit: 3	Max Marks: 150 (IA :30, ETE:120)
3L+ 0T+ 0P	End Term Exams: 3 hr

S. No.	Content	Hour
1	INTRODUCTION OF TIMESERIES ANALYSIS: Introduction to Time Series and Forecasting, Different types of data, Internal structures of time series. Models for time series analysis, Autocorrelation and Partial autocorrelation. Examples of Time series Nature and uses of forecasting, Forecasting Process, Data for forecasting, Resources for forecasting.	7
2	STATISTICS BACKGROUND FOR FORECASTING: Graphical Displays, Time Series Plots, Plotting Smoothed Data, Numerical Description of Time Series Data, Use of Data Transformations and Adjustments, General Approach to Time Series Modeling and Forecasting, Evaluating and Monitoring Forecasting Model Performance.	7
3	TIME SERIES REGRESSION MODEL: Introduction Least Squares Estimation in Linear Regression Models, Statistical Inference in Linear Regression, Prediction of New Observations, Model Adequacy Checking, Variable Selection Methods in Regression, Generalized and Weighted Least Squares, Regression Models for General Time Series Data, Exponential Smoothing, First order and Second order.	7
4	AUTOREGRESSIVE INTEGRATED MOVING AVERAGE (ARIMA) MODELS: Autoregressive Moving Average (ARMA) Models - Stationarity and Invertibility of ARMA Models - Checking for Stationarity using Variogram- Detecting Nonstationarity - Autoregressive Integrated Moving Average (ARIMA) Models - Forecasting using ARIMA - Seasonal Data - Seasonal ARIMA Models Forecasting using Seasonal ARIMA Models Introduction - Finding the "BEST" Model -Example: Internet Users Data- Model Selection Criteria - Impulse Response Function to Study the Differences in Models Comparing Impulse Response Functions for Competing Models .	7
5	MULTIVARIATE TIME SERIES MODELS AND FORECASTING: Multivariate Time Series Models and Forecasting, Multivariate Stationary Process, Vector ARIMA Models, Vector AR (VAR) Models, Neural Networks and Forecasting Spectral Analysis, Bayesian Methods in Forecasting.	7
	Total	35

#### **TEXTBOOKS:**

**Introduction To Time Series Analysis And Forecasting**, 2nd Edition, Wiley Series In Probability And Statistics, By Douglas C. Montgomery, Cheryl L. Jen(2015)

**Master Time Series Data Processing, Visualization, And Modeling Using Python** Dr. Avishek Pal Dr. Pks Prakash (2017)



## 8ML4-21: Time Series Analysis and Forecasting Lab

Credit: 1	Max Marks: 50 (IA :30, ETE:20)
0L+ 0T+ 2P	End Term Exams: 2hr

S. No.	Task to perform on Time Series data
1	<ul> <li>Time Series Data Cleaning</li> <li>Loading and Handling Times series data</li> <li>Preprocessing Techniques</li> </ul>
2	<ul> <li>How to Check Stationarity of a Time Series.</li> <li>How to make a Time Series Stationary?</li> <li>Estimating &amp; Eliminating Trend.</li> <li>Aggregation <ul> <li>Smoothing</li> <li>Polynomial Fitting</li> </ul> </li> <li>Eliminating Trend and Seasonality <ul> <li>Differencing</li> <li>Decomposition</li> </ul> </li> </ul>
3	<ul><li>a) Moving Average time analysis data.</li><li>b) Smoothing the Time analysis Data.</li><li>c) Check out the Time series Linear and non-linear trends.</li><li>d) Create a modelling.</li></ul>
4	Modelling time series <ul> <li>Moving average</li> <li>Exponential smoothing</li> <li>ARIMA</li> </ul> Seasonal autoregressive integrated moving average model (SARIMA)
5	<ul> <li>Dependence Techniques <ul> <li>Multivariate Analysis of Variance and Covariance</li> <li>Canonical Correlation Analysis</li> <li>Structural Equation Modeling</li> </ul> </li> <li>Inter-Dependence Techniques <ul> <li>Factor Analysis</li> <li>Cluster Analysis</li> </ul> </li> </ul>



## 8ML4-21: Cyber Security Lab

Credit: 1	Max Marks: 50 (IA :30, ETE:20)
0L+ 0T+ 2P	End Term Exams: 2hr

SN	List of Experiments
1	Implement the following Substitution & Transposition Techniques concepts:
	a) Caesar Cipher b) Rail fence row & Column Transformation
2	Implement the Diffie-Hellman Key Exchange mechanism using HTML and
	JavaScript. Consider the end user as one of the parties (Alice) and theJavaScript
	application as other party (bob).
3	Implement the following Attack:
	a) Dictionary Attack b) Brute Force Attack
4	Installation of Wire shark, TCP dump, etc. and observe data transferred in client
	server communication using UDP/TCP and identify the UDP/TCP
	datagram.
5	Installation of rootkits and study about the variety of options.
6	Perform an Experiment to Sniff Traffic using ARP Poisoning.
7	Demonstrate intrusion detection system using any tool
	(Snort or any others/w).
8	Demonstrate how to provide secure data storage, secure data transmission
	and for creating digital signatures.