Scheme & Syllabus of

UNDERGRADUATE DEGREE COURSE

B.Tech. VII & VIII Semester

Computer Science & Engineering (Artificial Intelligence & Machine Learning)

Bikaner Technical University, Bikaner

Effective from session: 2021 – 2022

Teaching & Examination Scheme
B.Tech. : Computer Science & Engineering (Artificial Intelligence & Machine Learning)
4th Year – VII Semester

SN	Category	Course Code	Course Title	L	T	P	Exm Hrs	IA	ETE	Total	Cr
THEORY											
1	PCC	7CS4-01	Internet of Things	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	7CS4-21	Internet of Things Lab	0	0	4	2	60	40	**100**	**2**
4	PCC	7CS4-22	Cyber Security Lab	0	0	4	2	60	40	**100**	**2**
6	PSIT	7CS7-30	Industrial Training	1	0	0				**125**	**2.5**
7	PSIT	7CS7-40	Seminar	2	0	0				**100**	**2**
8	SODE CA	7CS8-00	Social Outreach, Discipline &Extra Curricular Activities							**25**	**0.5**
			Sub- Total	**0**	**0**	**10**	**4**	**120**	**80**	**450**	**9**
			TOTAL OF VII SEMESTER	**6**	**0**	**10**	**10**	**180**	**320**	**750**	**15**

L: Lecture, T: Tutorial, P: Practical, Cr: Credits
ETE: End Term Exam, IA: Internal Assessment

Teaching & Examination Scheme
B.Tech. : Computer Science & Engineering (Artificial Intelligence & Machine Learning)
4th Year – VIII Semester

SN	Category	Course Code	Course Title	L	T	P	Exm Hrs	IA	ETE	Total	Cr
			THEORY								
1	PCC/ PEC	8CS4-01	Deep Learning	3	0	0	3	30	120	**150**	**3**
2	OE		Open Elective - II	3	0	0	3	30	120	**150**	**3**
			Sub Total	**6**	**0**	**0**	**6**	**60**	**240**	**300**	**6**
			PRACTICAL & SESSIONAL								
3	PCC	8CS4-21	Deep Learning Lab	0	0	2	2	30	20	**50**	**1**
4	PCC	8CS4-22	Software Testing and Validation Lab	0	0	2	2	30	20	**50**	**1**
5	PSIT	8CS7-0	Project	3	0	0		210	140	**350**	**7**
6	SOD E CA	8CS8-00	Social Outreach, Discipline &Extra Curricular Activities							**25**	**0.5**
			Sub- Total	**0**	**0**	**4**	**4**	**120**	**80**	**475**	**9.5**
		TOTAL OF VIII SEMESTER		**6**	**0**	**4**	**10**	**180**	**320**	**775**	**15.5**

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

ETE: End Term Exam, IA: Internal Assessment

List of Open Electives for Computer Science & Engineering

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

7CS4-01: Internet of Things

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to IoT:** Definition and characteristics of IoT, Design of IOT: Physical design of IOT, Logical Design of IOT- Functional Blocks, communication models, communication APIs, IOT enabling Technologies- Wireless Sensor Networks, Cloud computing, big data analytics, embedded systems. IOT Levels and deployment templates.	08
3	**IoT Hardware and Software:** Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS.	07
4	**Architecture and Reference Model:** Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers (URIs). Challenges in IoT- Design challenges, Development challenges, Security challenges, Other challenges.	08
5	**IOT and M2M:** M2M, Difference and similarities between IOT and M2M, Software defined networks, network function virtualization, difference between SDN and NFV for IoT.	08
6	**Case study of IoT Applications:** Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyles.	08
Total		**40**

7CS4-21: Internet of Things Lab

Credit: 2   **Max. Marks: 100(IA:60, ETE:40)**
0L+0T+4P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Start Raspberry Pi and try various Linix commands in command terminal window: *ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown,* *chgrp, ping etc.*
2	Run some python programs on Pi like: a) Read your name and print Hello message with name b) Read two numbers and print their sum, difference, product and division. c) Word and character count of a given string. d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.
3	Run some python programs on Pi like: a) Print a name 'n' times, where name and n are read from standard input, using for and while loops. b) Handle Divided by Zero Exception. c) Print current time for 10 times with an interval of 10 seconds. d) Read a file line by line and print the word count of each line.
4	a) Light an LED through Python program b) Get input from two switches and switch on corresponding LEDs c) Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
5	a) Flash an LED based on cron output (acts as an alarm) b) Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load. c) Get the status of a bulb at a remote place (on the LAN) through web.
	The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

7CS4-22: Cyber Security Lab

Credit: 2   **Max. Marks: 100(IA:60, ETE:40)**
0L+0T+4P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipherb) 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 the JavaScript application as other party (bob).
3	Implement the following Attack: a) Dictionary Attack b) Brute Force Attack
4	Installation of Wire shark, tcpdump, 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 other s/w).
8	Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures.
	PROJECT: In a small area location such as a house, office or in a classroom, there is a small network called a Local Area Network (LAN). The project aims to transfer a file peer-to-peer from one computer to another computer in the same LAN. It provides the necessary authentication for file transferring in the network transmission. By implementing the Server-Client technology, use a File Transfer Protocol mechanism and through socket programming, the end user is able to send and receive the encrypted and decrypted file in the LAN. An additional aim of the project is to transfer a file between computers securely in LANs. Elements of security are needed in the project because securing the files is an important task, which ensures files are not captured or altered by anyone on the same network. Whenever you transmit files over a network, there is a good chance your data will be encrypted by encryption technique. Any algorithm like AES is used to encrypt the file that needs to transfer to another computer. The encrypted file is then sent to a receiver computer and will need to be decrypted before the user can open the file.

8CS4-01: Deep Learning

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**INTRODUCTION TO NEURAL NETWORKS** Structure and working of Biological Neural Network, Fundamentals of Artificial Neural Networks & Applications, Characteristics of Artificial Neural Networks, History of neural network research, characteristics of neural networks terminology. Introduction of Artificial Neural Networks (ANN) - Functions in ANN **NEURAL NETWORKS MODELS** Models of neuron McCulloch – Pitts model, Perceptron, Adaline model, Basic learning laws, Topology of neural network architecture, Multilayer Neural Networks. – Activation function, Loss function - Function approximation, classification / clustering problems - Applications	**08**
2	**LEARNING IN DEEP NETWORKS** Back propagation training, Learning the weights, Chain rule, Stochastic gradient descent, Sigmoid units and vanishing gradient, Rectified Linear Unit (ReLU) and its variants - Cross entropy for classification and activation, Batch learning.	**08**
3	**IMPROVING DEEP NEURAL NETWORKS** Hyper-parameter tuning, Regularization - Dropouts, Minibatch gradient descent, Data Augmentation, Stratification, Generalization Gap – Under-fitting Vs Over-fitting - Optimization – Momentum, Learning rate schedules, AdaGrad, RMSProp and Adam optimization, Internal Co-variant and Batch Normalization, Initialization – weights, Bias	**08**
4	**CONVOLUTION NEURAL NETWORKS** CNN Operations, Pooling, Basic architecture, Variants of the Basic Convolution Model – Advanced architectures : AlexNet, ResNet and others.	**08**
5	**RECURRENT NETWORKS** Recurrent Neural Networks - Bidirectional RNNs, Encoder, Decoder, Sequence-to-Sequence Architectures, Deep Recurrent Networks, Auto encoders **Introduction to RECURSIVE NEURAL NETWORKS :** LSTM , Gated RNNs.	**08**
		40

Suggested Books:

1. Deep Learning, Ian Goodfellow Yoshua Bengio Aaron Courville, MIT Press, 2017
2. Neural Networks and Deep Learning, Michael Nielsen,, Determination Press
3. Deep Learning Step by Step with Python, N D Lewis, 2016
4. Deep Learning: A Practitioner's Approach, Josh Patterson, Adam Gibson, O'Reilly Media, 2017

8CS4-21 Deep Learning Lab

Credit: 2   **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P   **End Term Exam: 2 Hours**

SN	List of Experiments

1-2-3	Demonstration and implementation of Shallow architecture, using Python, Tensorflow and Keras
	  i) Google Colaboratory - Cloning GitHub repository, Upload Data, Importing Kaggle's dataset, Basic File operations
	  ii) Implementing Perceptron,
	  iii) Digit Classification : Neural network to classify MNIST dataset

4-5	Convolution Neural Network application using Tensorflow and Keras,
	  i) Classification of MNIST Dataset using CNN
	  ii) Face recognition using CNN

6	Image denoising (Fashion dataset) using Auto Encoders - Handling Color Image in Neural Network aka Stacked Auto Encoders (Denoising)
7	Text processing, Language Modeling using RNN
8	Time Series Prediction using RNN
9	Sentiment Analysis using LSTM
10	Image generation using GAN

8CS4-22: Software Testing and Validation Lab

Credit: 1   **Max. Marks:50 (IA:30, ETE:20)**

0L+0T+2P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	a) Write a program that calculates the area and perimeter of the circle. And find the Coverage & Test Cases of that program using JaButi Tool. b) Write a program which read the first name and last name from console and matching with expected result by using JaBuTi. c) Write a program that takes three double numbers from the java console representing , respectively, the three coefficients a,b, and c of a quadratic equation. d) Write a program that reads commercial website URL from a url from file .you should expect that the URL starts with www and ends with .com. retrieve the name of the site and output it. For instance, if the user inputs www.yahoo.com, you should output yahoo. After that find the test cases and coverage using JaButi. e) Write a program for a calculator and find the test case and coverage and Def-use-graph. f) Write a program that reads two words representing passwords from the java console and outputs the number of character in the smaller of the two. For example, if the words are open and sesame, then the output should be 4, the length of the shorter word, open. And test this program using JaButi
2	Analyse the performance of following website using JMeter. |Site Amazon|Website Amazon.com|Type shopping
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Flip kart	Flipkart.com	shopping
Railway reservation	Irctc.co.in	Ticket booking site
Train searching	Erail.in	Train searching	
3	Calculate the mutation score of programs given in 1(a) to 1 (f) using jumble Tool.
4	Calculate the coverage analysis of programs given in 1 (a) to 1 (f) using Eclemma Free open source Tool.
5	Generate Test sequences and validate using Selenium tool for given websites below : |Site Amazon|Website Amazon.com|Type shopping
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Flip kart	Flipkart.com	shopping
Railway reservation	Irctc.co.in	Ticket booking site
Train searching	Erail.in	Train searching	