

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Permanent Affiliation to JNTUK, Kakinada), PEDATADEPALLI, TADEPALLIGUDEM-534 101



Department of Computer Science and Engineering

B.Tech CSE(Artificial Intelligence)

&

B.Tech (Artificial Intelligence & Machine Learning)

Date: 26.07.2022

Minutes of the Second Board of Studies

The Second Meeting of BOS, B.Tech in CSE(AI) and B.Tech in AI&ML is held at 10:00AM through online mode on 25.07.2022(Monday) using the following link:

<https://us02web.zoom.us/j/83338219367>

The following members attended the meeting:

S.No.	Name of the Member	Designation	Role
1.	Dr. D Jaya Kumari	Professor, HoD-CSE, SVEC	Chairperson
2.	Dr.Dasari Haritha	Professor &HOD, UCEK, Kakinada	University Nominee
3.	Dr Nagesh Bhattu Sristy	Asst.Professor, Department of CSE,NIT- AP	Academic Expert
4.	Dr. K. Venkata Rao	Professor, Dept of CS&SE, Andhra University.	Academic Expert
5.	Sri. Seshagiri Telkapalli	Enterprise Architect, TCS Hyderabad.	Industry Expert
6.	Sri. M Jnana Surya Prakasha Rao	Pragmasys consulting LLP, Gurgaon	Alumni
7.	Sri Ch. Apparao	Technical Director	Invited Member
8.	Dr. V. Venkateswara Rao	Professor	Member
9.	Dr. G Loshma	Professor	Member
10.	Dr. V S Naresh	Professor	Member
11.	Dr. Ch. Raja Ramesh	Associate Professor	Member
12.	A. Leelavathi	Sr. Assistant Professor	Member
13.	R. LeelaPhani Kumar	Assistant Professor	Member
14.	D Sasi Rekha	Assistant Professor	Member
15.	B.SriRamya	Assistant Professor	Member
16.	G.Sriram Ganesh	Assistant Professor	Member
17.	N.V.Murali Krishna Raja	Assistant Professor	Member
18.	K Lakshmi Narayana	Assistant Professor	Member
19.	D.S L Manikanteswari	Assistant Professor	Member
20.	M Babu Rao	Assistant Professor	Member
21.	P Rajesh	Assistant Professor	Member
22.	M Sree Radha Mangamani	Assistant Professor	Member
23.	Ch Hemanandh	Assistant Professor	Member
24.	M Chilaka Rao	Assistant Professor	Member
25.	A Nageswara Rao	Assistant Professor	Member
26.	A NagaJyothi	Assistant Professor	Member
27.	G Prashanthi	Assistant Professor	Member
28.	M Yesu Shekharam	Assistant Professor	Member
29.	G Jaya Raju	Assistant Professor	Member
30.	K Lakshmaji	Assistant Professor	Member

Members Absent:

S.No.	Name of the Member	Designation	Role
1.	Sri. Vinay Kumar	Director,XpertBridge, Hyderabad.	Industry Expert

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Item No. 1: Welcome note by the Chairman BOS.

The HOD extended a formal welcome and introduced the members.

Item No. 2: Progress Report of the Department

Item No. 3: Review of Course Structure for I to II Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation.

The details are given in Annexure-I.

Item No. 4: Approval of Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation.

Approved the Course Structure and Syllabus for III and IV Semesters of B.Tech in CSE(AI) and B.Tech in AI&ML Programmes under V20 Regulation and suggested the following changes:

SEM	Course Code	Course Name	Suggestions	Inclusions / Modifications
III	V20AIT02	Advanced Python Programming	In Advanced Python Programming course it was suggested that include Database Connectivity	Included Database connectivity in Advanced Python Programming course.
III	V20AIL03	Advanced Python Programming Lab	In Advanced Python Programming Lab course it was suggested that include Database Connectivity Programs and also move pandas library programs to Pandas session.	Included Database Connectivity Programs in Advanced Python Programming Lab course and also moved the related programs to pandas.
III	V20AIL05	Database Management Systems Lab	In Database Management Systems Lab Course it was suggested that exclude Part-B (MongoDb)	Excluded Part-B (MongoDb).
IV	V20AIT06	Java Programming	In Java Programming Course it was suggested that replace Collections instead of swings	Included Collections
IV	V20AIL06	Java Programming Lab	In Java Programming Lab Course it was suggested that replace Collections Programs instead of swings	Included Collections Programs
IV	V20CST11 & V20CSL09	Data Mining & Data Mining Lab	It was suggested that replace Data Mining (T+L) course with Operating Systems (T+L)	Added: <ul style="list-style-type: none">• V20AIT07: Operating Systems• V20AIL07: Operating Systems Lab

The Approved and Modified Course Structure and Syllabus is given in **Annexure-II**.

Chairperson of BOS
(Dr.D Jaya Kumari)

Head of the Department
Dept. of Computer Science & Engineering
Sri Vasavi Engineering College
TADAPALLIGUDEM-534 101

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Department of Computer Science and Engineering

B.Tech CSE(Artificial Intelligence)

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B.Tech (Artificial Intelligence & Machine Learning)

Annexure-I

SEMESTER - I (FIRST YEAR)

S.No.	Course Code	Name of the Course	L	T	P	C
1	V20MAT01	Linear Algebra and Differential Equations	3	-	-	3
2	V20MAT09	Descriptive Statistics	3	-	-	3
3	V20ENT01	English for Professional Enhancement	3	-	-	3
4	V20AIL01	Computer Engineering Workshop	1	-	4	3
5	V20CST01	Programming in „C“ for problem Solving	3	-	-	3
6	V20ENL01	Hone Your Communication Skills Lab -I	-	-	3	1.5
7	V20AIL02	Statistical Visualization using R Lab	-	-	3	1.5
8	V20CSL01	Programming Lab in „C“ for problem Solving	-	-	3	1.5
Total:			13	-	13	19.5

Total Contact Hours: 26

Total Credits: 19.5

SEMESTER - II (FIRST YEAR)

S.No.	Course Code	Name of the Course	L	T	P	C
1	V20MAT10	Integral Transformations and Vector Calculus	3	-	-	3
2	V20CST02	Python Programming	3	-	-	3
3	V20ECT01	Switching Theory and Logic Design	3	-	-	3
4	V20CST04	Data Structures	3	-	-	3
5	V20AIT01	Introduction to Artificial Intelligence	3	-	-	3
6	V20CSL02	Python Programming Lab	-	-	3	1.5
7	V20CSL04	Data Structures Lab	-	-	3	1.5
8	V20ENL02	Hone Your Communication Skills Lab -II	-	-	3	1.5
9	V20CHT02	Environmental Science	2	-	-	0
Total:			17	-	09	19.5

Total Contact Hours: 26

Total Credits: 19.5

Annexure-II

SEMESTER-III (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20MBT51	Managerial Economics and Financial Analysis	HSS	3	0	0	3
2	V20MAT11	Probability Theory	BSC	3	0	0	3
3	V20MAT07	Mathematical Foundation of Computer Science	BSC	3	0	0	3
4	V20AIT02	Advanced Python Programming	PCC	3	0	0	3
5	V20AIT03	Database Management Systems	PCC	3	0	0	3
6	V20AIL03	Advanced Python Programming Lab	PCC	0	0	3	1.5
7	V20AIL04	Linux Shell Scripting Lab	PCC	0	0	3	1.5
8	V20AIL05	Database Management Systems Lab.	PCC	0	0	3	1.5
9	V20SOC01	Skill Oriented Course-I	SO	1	0	2	2
10	V20ENT02	Professional Communication Skills -I	MNC	2	0	0	0
Total:				18	0	11	21.5

Total Contact Hours: 29

Total Credits: 21.5

SEMESTER - IV (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20AIT04	Computer Organization and Architecture	PCC	3	0	0	3
2	V20AIT05	Design and Analysis of Algorithms	PCC	3	0	0	3
3	V20AIT06	Java Programming	PCC	3	0	0	3
4	V20AIT07	Operating Systems	PCC	3	0	0	3
5	V20AIT08	Artificial Intelligence and its Applications	PCC	3	0	0	3
6	V20AIL06	Java Programming Lab	PCC	0	0	3	1.5
7	V20AIL07	Operating Systems Lab	PCC	0	0	3	1.5
8	V20AIL08	Artificial Intelligence Lab	PCC	0	0	3	1.5
9	V20SOC02	Skill Oriented Course-II	SO	1	0	0	2
10	V20ENT03	Professional Communication Skills -II	MNC	2	0	0	0
Total:				18	0	11	21.5

Total Contact Hours: 29

Total Credits: 21.5

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20MBT51
Name of the Course	Managerial Economics and Financial Analysis					
Branch	Common to All Branches					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Understand the basic concepts of managerial economics, demand, elasticity of demand and methods of demand forecasting. **(K2)**
- CO2:** Interpret production concept, least cost combinations and various costs concepts in decision making. **(K3)**
- CO3:** Differentiate various Markets and Pricing methods along with Business Cycles. **(K2)**
- CO4:** Prepare financial statements and its analysis. **(K3)**
- CO5:** Assess various investment project proposals with the help of Capital Budgeting techniques for decision making. **(K3)**

UNIT-I: Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concept of Demand-Types-Determinants-Law of Demand its Exceptions-Elasticity of Demand-Types and Measurement- Demand forecasting and its Measuring Methods.

UNIT-II: Production and Cost Analysis: Production function-Iso-quants and Iso-cost-Law of Variable proportions-Cobb-Douglas Production function-Economies of Scale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs- Cost Volume Profit analysis- Determination of Break-Even Point- BEP Chart (Simple Problems).

UNIT-III: Introduction To Markets, Pricing Policies & forms of Organizations and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic and Oligopoly – Features – Price,Out-put Determination – Methods of Pricing: Evolution of Business Forms - Features of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises. Business Cycles – Meaning and Features – Phases of Business Cycle.

UNIT-IV: Introduction to Accounting & Financing Analysis: Introduction to Double Entry System – Preparation of Financial Statements- Trading Account, Profit & Loss Account and Balance Sheet - Ratio Analysis – (Simple Problems).

UNIT-V: Capital and Capital Budgeting:Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

Text Books

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: ‘Managerial Economics and Financial Analysis’,Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. ‘Managerial Economics and Financial Analysis’, Ravindra Publication.

References:

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics &Financial Analysis,Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui&A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
9. PankajTandonA Text Book of Microeconomic Theory, Sage Publishers, 2015
10. ShailajaGajjala and UshaMunipalle, Univerties press, 2012.

Semester	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20MAT11
Name of the Course	Probability Theory					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Find the statistical parameters of given function. **(K3)**
- CO2:** Apply probability distribution to real time problems. **(K3)**
- CO3:** Create good estimators to various parameters **(K3)**
- CO4:** Apply the principles of Statistical Inference to practical problems on large samples. **(K3)**
- CO5:** Apply the principles of Statistical Inference to practical problems on small samples. **(K3)**

UNIT-I: Random Variables and expectation: Random Variables: Discrete and continuous - Probability function – density and distribution function, Expectation of a Random Variable, Moments, Chebychev's Inequality (Without proof).

UNIT -II: Probability Distributions: Probability distributions: Binomial, Poisson and Normal - Evaluation of statistical parameters: Mean, Variance and their properties, Introduction to Exponential, Gamma and Weibull distributions.

UNIT -III: Sampling Distribution and Estimation: Introduction –Sampling distribution of means with known and unknown standard deviation.

Estimation: Criteria of a good estimator, point and interval estimators for means and proportions.

UNIT -IV: Tests of Hypothesis: Introduction-Type-I, Type-II Errors, Maximum Error, one–tail, two-tail tests, **Test of significance:** Large sample test for single proportion, difference of proportions, single mean, difference of means.

UNIT -V: Tests of significance: Test of significance: Small sample test for single mean, difference of means and test of ratio of variances (F-Test) - Chi-square test for goodness of fit and independence of attributes.

Text Books:

1. **B. V. Ramana**, A text Book of Engineering Mathematics, Tata McGraw Hill.
2. **Miller & Freund's**, Probability & Statistics for Engineers – Eighth Edition, Richard. A. Johnson

References Books:

1. **S. Ross**, “A First Course in Probability”, Pearson Education India, 2002.
2. **Dr.T.S.R.Murthy**, Probability and Statistics for Engineers, BS Publications.
3. **T. Veerarajan**, “Engineering Mathematics”, Tata McGraw-Hill, New Delhi, 2010.

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20MAT07
Name of the Course	Mathematical Foundation of Computer Science					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Demonstrate the concepts associated with propositions and mathematical logic. **(K3)**
- CO2:** Demonstrate the basic concepts associated with relations, functions and their applications. **(K3)**
- CO3:** Solve recurrence relations using various methods. **(K3)**
- CO4:** Apply techniques of graphs for real-time problems. **(K3)**
- CO5:** Construct minimal spanning tree by using different algorithms. **(K3)**

UNIT-I : Mathematical Logic: Statements and Notation , Connectives, Well Formed Formulas ,Truth tables, Tautologies, Equivalence of formulas, Tautological Implications, Normal forms, Theory of inference for Statement Calculus, Indirect Method of Proof. Predicate calculus-Predicates, quantifiers, universe of discourse.

UNIT-II: Set Theory and Relations: Operations on Sets, Principle of Inclusion and Exclusion, Relations, Properties of Binary Relations in a set, Transitive Closure, Relation Matrix and Digraph, Equivalence, Partial Ordering Relations, Hasse Diagrams, Lattice and its Properties, Functions, Bijective Functions, Composition of Functions.

UNIT-III: Recurrence relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-IV: Graph Theory:Basic Concepts of graph, Representing graphs, Sub graphs, Isomorphic graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Planar graphs, Graph Coloring, Chromatic Number. (Theorems without proofs).

UNIT-V: Trees: Spanning Trees, minimal Spanning Trees, BFS, DFS, Kruskal's Algorithm, Prim's Algorithm, Binary trees, Planar Graphs.

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, 1st Edition, Tata McGraw Hill.
2. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H.Rosen, 7th Edition, Tata McGraw Hill.
3. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.

Reference Books:

1. Elements of Discrete Mathematics -A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
2. Discrete Mathematics with Combinatorics and Graph Theory, Santha, 1st Edition Cengage Learning.

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	III	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT02
Name of the Course	Advanced Python Programming					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Regular Expressions and Database Connectivity. **(K2)**

CO2: Develop GUI interfaces using widgets. **(K3)**

CO3: Demonstrate statistical analysis using Numpy. **(K3)**

CO4: Demonstrate data analysis using pandas. **(K3)**

CO5: Develop different types of charts using matplotlib. **(K3)**

UNIT-I: Regular Expressions: Sequence Characters, Quantifiers, Special Characters.

Database Connectivity: Advantages of a DBMS over files, Installation of MYSQL DB Software, using MYSQL from Python, retrieve, insert, delete, update operations on tables.

UNIT-II: Graphical User Interface: GUI in python, The root window, fonts and colors, working with containers, canvas, frame, widgets, Button widgets, Arranging widgets in the frame, Label widget, message widget, Text widget, scrollbar Widget, Check button Widget, Radio button widget, entry widget, listbox widget.

UNIT-III: Working with Arrays using Numpy : Introduction to Numpy, Functions for generating sequences , Aggregate functions , Generating Random Numbers using Numpy , Zeros, ones, eyes and Full , Indexing , Slicing , Scalar with an Array operations , Array with an Array Operations. Joining Arrays , Splitting arrays , Variance , covariance , correlation.

UNIT-IV: Data Analysis using Pandas: Introduction , Creating Pandas series , Indexing, iloc, slicing and Boolean index , sorting , statistical Analysis , and string functions , creating data frames , dealing with rows , iterating a pandas data frame- data frame methods (Head, tail and describe), Boolean index , sorting , statistical Analysis , and string functions , Reading of formatted files, Handling Missing values.

UNIT-V: Data visualization: Introduction , plot function , plotting lines and curves, Additional Arguments, The bar Chart ,box plot , frequency plots and Histogram , the pie chart.

Text Books:

1. Core Python Programming Dr. R Nageswara Rao Dreamtech publications.
2. Problem solving and python programming fundamentals and application: Numpy, Pandas and Matplotlib. HarshaBhasin.

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Semester	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT03
Name of the Course	Database Management Systems					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- | | |
|--|-------------|
| CO1: Describe Database systems, various Data models and Database architecture. | (K2) |
| CO2: Develop various real time applications using Relational algebra and Relational calculus. | (K3) |
| CO3: Apply various Normalization techniques to refine schema. | (K3) |
| CO4: Explain Transaction management and Concurrency control. | (K2) |
| CO5: Illustrate various Database indexing techniques. | (K2) |

UNIT-I:An Overview of Database Systems: Managing data, File systems verses DBMS, Advantages of DBMS, Data models, Levels of abstraction in a DBMS, Data independence, Structure of a DBMS, Client/Server Architecture, E.F.Codd Rules.

Database Design: Database design and ER Diagrams, Entities, Attributes, Entity sets, Relationships and Relationship sets, Conceptual design with ER Models.

UNIT-II: Relational Model: Integrity constraints over relations, Key constraints, Foreign key constraints, General constraints, Enforcing integrity constraints, Querying relational data

Relational Algebra: Selection and Projection, set operation, renaming, Joins, Division, Introduction to Views, destroying/altering Tables and Views. **Relational Calculus:** Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and active data bases. **Schema Refinement (Normalization):** Problems caused by redundancy, Decompositions, purpose of Normalization, Schema refinement, Concept of functional dependency, Normal forms based on functional dependency (1NF, 2NF and 3NF), Concept of Surrogate key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency preserving decomposition, Fourth Normal Form(4NF).

UNIT-IV: Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction management with SQL commit, rollback and savepoint. **Concurrency Control:** Concurrency Control for Lost updates, Uncommitted data, Inconsistent retrievals and the Scheduler.

Concurrency Control with Locking Methods : Lock granularity, Lock types, Two phase locking for ensuring serializability, Deadlocks, Concurrency control with Time stamp ordering, Transaction recovery.

UNIT-V: Storage and Indexing: Overview of Storages and Indexing, Data on external storage, File organization and indexing, Clustered indexing, Primary and secondary indexes, Index data structures, Hash based indexing, Tree based indexing, Comparison of file organization

Text Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.
2. An Introduction to Database Systems, C.J Date,A.Kannan,S.JSwamynathan 8th Edition, Pearson Education

Reference Books:

1. Database Systems-Design, Implementation and Management, Peter Rob &Carlos Coronel 7th Edition, Course Technology Inc.
2. Fundamentals of Database Systems, RamezElmasri,Shamkant B. Navathe ,7th Edition, Pearson Education.
3. Database Systems - The Complete Book, Hector Garcia- Molina, Jeffry D Ullman, Jennifer Widom, 2nd Edition, Pearson.

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20AIL03
Name of the Course	Advanced Python Programming Lab					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Develop Python Programs using regular expressions and Database. (K3)
CO2: Develop programs using GUI. (K3)
CO3: Construct programs using Numpy Arrays. (K3)
CO4: Develop python programs using pandas. (K3)
CO5: Develop charts using matplotlib. (K3)

LIST OF EXPERIMENTS

1. Regular expressions & Database:

- a) Develop a python program to create regular expression to replace a string with a new string.
- b) Develop a python program to create regular expression to retrieve all the words starting with 'a' in a given string and other create other regular expression to retrieve all the words with size 5.
- c) Develop a Python Program to create a regular expression to search for string using search() , findall() , match().
- d) Create a python program to connect MYSQL database and perform operations viz. retrieve, insert, delete and update.

2. GUI:

- a) Develop a Python Program to draw different shapes on canvas.
- b) Develop a Python Program to create a push button and bind it with an event handler function using command option.
- c) Develop a Python Program to design a simple calculator.
- d) Develop a Python Program to create check boxes and display the content of selected boxes.
- e) Develop a Python Program using GUI to retrieve a row from a MYSQL database table.

2. Numpy

- a. Develop a Python Program to split arrays using numpy module.
- b. Develop a Python Program to test all aggregate functions in numpy module
- c. Develop a Python Program to generate a matrix of random numbers within range and print its Transpose.
- d. Develop a Python Program that calculates variance, co variance, correlation by taking a sample statistical data.
- e. Develop a python program to find rank, determinant, and trace of an array.
- f. Develop a python program to find eigenvalues of matrices.
- g. Develop a python program to find matrix and vector products (dot, inner, outer, product), matrix exponentiation.
- h. Develop a python program to solve a linear matrix equation, or system of linear scalar equations.

3. Pandas

- a. Develop a python program to implement Pandas Series with labels, dictionary and Numpy.
- b. Develop a program to creating a Pandas DataFrame using dictionary and two dimensional array.
- c. Develop a program which make use of following Pandas methods
i) describe() ii) head() iii) tail()
- d. Develop a python program to perform insert, delete row operations on data frame.
- e. Develop a python program of groupby() method.
- f. Demonstrate pandas Merging, Joining and Concatenating.
- g. Creating data frames from csv and excel files.

4. Pandas Library: Visualization

- a. Develop a program which use pandas inbuilt visualization to plot following graphs:
 - i. Bar plots
 - ii. Histograms
 - iii. Line plots
 - iv. Scatter plots

Text Books:

1. Core Python Programming Dr. R Nageswara Rao Dreamtech publications.
2. Problem solving and python programming fundametals and application: Numpy, Pandas and Matplotlib. HarshaBhasin.

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Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V20	0	0	0	1.5	V20AIL04
Name of the Course	Linux Shell Scripting Lab					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Demonstrate the basic knowledge of Linux commands and utilities by using Linux shell environment. **(K3)**
- CO2:** Experiment with the Concept of shell Programming on Files and Directories. **(K3)**
- CO3:** Experiment with the Concept of shell Programming on File Permissions. **(K3)**
- CO4:** Experiment with the Concept of shell Programming on Conditional Statements. **(K3)**
- CO5:** Experiment with the Concept of shell Programming on Looping Statements. **(K3)**

LIST OF EXPERIMENTS

1. Experiment the following Unix Commands:
 - a) **General Purpose Utilities:** cal, date,man,who.
 - b) **Directory Handling Commands:** pwd,cd,mkdir,rmdir.
 - c) **File Handling Utilities:** cat,cp,ls,rm,nl,wc
 - d) **Displaying Commands:** head, tail
 - e) **Filters:** cmp,comm.,diff,sort,uniq
 - f) **Disk Utilities:** du,df
2. Develop a Shell Program to Display all the words which are entered as command line arguments.
3. Develop a shell script that Changes Permissions of files in PWD as rwx for users.
4. Develop a shell script to print the list of all sub directories in the current directory.
5. Develop a Shell Program which receives any year from the keyboard and determine whether the year is leap year or not. If no argument is supplied the current year should be assumed.
6. Develop a shell script which takes two file names as arguments-If their contents are same then delete the second file.
7. Develop a shell script to print the given number in the reversed order.
8. Develop a shell script to print first 25 Fibonacci numbers.
9. Develop a shell script to print the Prime numbers between the specified range.
10. Develop a shell script to delete all lines containing the word 'unix' in the files supplied as arguments.
11. Develop a shell script Menu driven program which has the following options.
 - i) contents of /etc/passwd
 - ii) list of users who have currently logged in.
 - iii) present working directory.
 - iv) exit.

Text Books:

1. UNIX and Shell Programming: A Textbook, Behrouz A. Forouzan | Richard F. Gilberg, Cengage Learning.
2. UNIX: Concepts and Applications, Sumithaba Das, 4th Edition, Tata McGrawHill.
3. Unix & Shell Programming, M.G.Venkatesh Murthy, Pearson Education.
4. UNIX shells by example, 4th Edition Ellie Quigley, Pearson Education.

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20AIL05
Name of the Course	Data Base Management System Lab					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- | | | |
|-------------|---|------|
| CO1: | Construct SQL queries to perform different database operations. | (K3) |
| CO2: | Experiment with various constraints and Database Indexing Techniques. | (K3) |
| CO3: | Construct PL/SQL Cursors and Exceptions | (K3) |
| CO4: | Develop PL/SQL Functions, Procedures and Packages | (K3) |
| CO5: | Apply basic operations on collections of Mongo DB database | (K3) |

LIST OF EXPERIMENTS

SQL:

- Construct SQL queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
- Construct SQL queries using Operators.
- Construct SQL queries to Retrieve and Change Data: Select, Insert, Delete and Update
- Construct SQL queries using Group By, Order By, and Having Clauses.
- Construct SQL queries on Controlling data: commit, rollback and savepoint
- Construct report using SQL*PLUS
- Construct SQL queries for Creating, Dropping and Altering Tables, Views and Constraints
- Construct SQL queries on Joins and Correlated Subqueries
- Demonstrate Index, Sequence and Synonym.
- Demonstrate Controlling access, locking rows for update and security features.

PL/SQL

- Demonstrate Basic Variables, Anchored Declarations, and Usage of Assignment Operation Using PL SQL block
- Demonstrate Bind and Substitution Variables using PL SQL block
- Demonstrate Control Structures in PL SQL
- Demonstrate Cursors, Exception and Composite Data Types in PL SQL.
- Demonstrate Procedures, Functions, and Packages in PLSQL.

Textbooks:

- Oracle Database 11g The Complete Reference by Oracle Press, Kevin Loney
- Database Systems Using Oracle, Nilesh Shah, 2nd Edition, PHI.
- Introduction to SQL, Rick F Vander Lans, 4th Edition, Pearson Education.

Reference Books:

- Oracle PL/SQL Interactive Workbook, B. Rosenzweig and E. Silvestrova, 2nd Edition, Pearson Education.
- SQL & PL/SQL for Oracle 10g, BlackBook, Dr. P.S. Deshpande, DreamTech.

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT04
Name of the Course	Computer Organization and Architecture					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Illustrate Basic structure of Computers, Instruction types and their addressing modes. (K2)
CO2: Describe the different modes of Input / Output transfer. (K2)
CO3: Illustrate different types of Memory. (K2)
CO4: Describe the different types of Control Unit techniques. (K2)
CO5: Explain the Concepts of Pipelining and Parallel Processing (K2)

UNIT-I: Introduction: Functional Units, Basic Operational Concepts, Bus Structures.

Instruction Sequencing and Addressing Modes: Instructions and Instruction Sequencing, Addressing modes, Basic Input/output Operations.

UNIT-II: Input/output Organization: Accessing Input/output devices, Interrupts- Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses-Synchronous and Asynchronous.

UNIT-III: Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative memory, Cache Memory. (Morris Mano)

UNIT-IV: Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control-Microinstructions, Microprogram Sequencing.

UNIT-V: Pipelining: Basic Concepts, Data Hazards, Instruction Hazards.

Parallelism: Parallel processing challenges – Flynn’s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

Text Books:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Edition, McGraw Hill Education. Computer System Architecture, M. Morris Mano, 3rd Edition, Pearson Education.
2. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 10th Edition, Pearson Education.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill Education.

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT05
Name of the Course	Design and Analysis of Algorithms					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Demonstrate asymptotic notation and divide and conquer technique. **(K3)**
CO2: Use greedy technique to solve various problems. **(K3)**
CO3: Demonstrate dynamic programming technique to various problems. **(K3)**
CO4: Develop algorithms using backtracking technique. **(K3)**
CO5: Demonstrate branch and bound technique to various problems. **(K3)**

UNIT-I: Introduction: What is an Algorithm, Algorithm Specification-Pseudo code Conventions Recursive Algorithms, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement.

UNIT-II: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT-III: Dynamic Programming: All Pairs Shortest Paths, Single Source Shortest paths General Weights, Explain Optimal Binary Search Trees, String Edition, 0/1 Knapsack, Reliability Design.

UNIT-IV: Backtracking: The General Method, 8-Queens Problem, Sum of Subsets, Graph Coloring, and Hamiltonian Cycles.

UNIT-V: Branch and Bound: The Method-Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson. Basic Concepts of NP-hard and NP-complete problems.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press.

Reference Books:

1. Introduction to Algorithms Thomas H. Cormen, PHI Learning.
2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D.Ullman.
3. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, Distributed by WILEY publications, New Delhi.
4. Algorithm Design, Jon Kleinberg, Pearson.

Approved Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation

Semester	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT06
Name of the Course	Java Programming					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Describe Java Virtual Machine and Type casting. **(K2)**
CO2: Demonstrate Concepts like Constructors, Arrays, Nested Classes and Command Line Arguments. **(K3)**
CO3: Implement Concepts of Inheritance and Exception Handling. **(K3)**
CO4: Develop programs on Multi-Threading and Files. **(K3)**
CO5: Demonstrate java Collection Classes. **(K3)**

UNIT-I: Introduction to Java: Introduction to Object Oriented Paradigm, Concepts of OOP, Applications of OOP, History of Java, Java Features, JVM, Program Structure. Variables, Primitive Data Types, Constants, String class, Primitive type conversion and Casting, Control Structures.

UNIT-II: Classes and Objects: Classes and objects, Class declaration, Creating objects, Methods, Constructors and Constructor Overloading, Importance of Static Keyword and Examples, this Keyword, Arrays, Command Line Arguments, Nested Classes, Garbage Collector.

UNIT-III: Inheritance and Exception Handling: Inheritance, super Keyword, final Keyword, Method Overriding and Abstract Class. Interfaces, Creating Packages, Using Packages, Importance of Class path. Exception Handling, Importance of try, catch, throw, throws and finally Block.

UNIT-IV: Multithreading and Files: Introduction, Thread Lifecycle, Creation of Threads, Thread Priorities, Thread Synchronization, Communication between Threads. Reading Data from Files and Writing Data to Files, Random Access Files.

UNIT-V: Java Collections Framework: collections overview, collection classes: ArrayList, LinkedList, HashSet, LinkedHashSet, TreeSet, HashMap. Accessing a Collection: Iterator and for-each.

Text Books:

1. Java Programming, E. Balagurusamy, 4th Edition, TMH.
2. The complete Reference Java, 8th Edition, Herbert Schildt, TMH.
3. Introduction to java programming, Y Daniel Liang, 7 Edition, Pearson.

Reference books:

1. Core Java: An Integrated Approach, R Nageswara Rao, 7th Edition, Dream Tech.
2. Head First Java, Kathy Sierra and Bert Bates, 2nd Edition O'reilly.

Semester	IV	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT07
Name of the Course	Operating Systems					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Describe Operating System Services and System Calls. **(K2)**
- CO2:** Illustrate Process Management Concepts and CPU Scheduling Algorithms. **(K3)**
- CO3:** Demonstrate Process Synchronization primitives and Process Deadlocks. **(K3)**
- CO4:** Illustrate Memory Management Techniques and Page Replacement Algorithms. **(K3)**
- CO5:** Describe File System Concepts and Mass Storage Structures. **(K2)**

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication. **Threads:** Overview, Multithreading Models

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-III: Process Synchronization: The Critical-Section Problem, Peterson’s Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors. **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT-IV: Memory Management: Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Introduction, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT-V: Storage Management: Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods.

Text Book:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012.

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012 .
2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley, 2007.

Semester	IV	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT08
Name of the Course	Artificial Intelligence & its applications					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:**Discuss Problem Solving Agents and Environment. **(K2)**
CO2:Identify Search Strategies for Non Deterministic and Unknown Environments. **(K2)**
CO3:Illustrate Adversarial Search for Game Playing. **(K2)**
CO4:Discuss Reasoning approaches. **(K2)**
CO5:Illustrate Knowledge Representation approaches. **(K2)**

UNIT I: Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents

Solving Problems by Searching: Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions

UNIT II: Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Search with Non Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environments

UNIT III: Adversarial Search : Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions, Stochastic Games, Partially Observable Games, State-of-the-Art Game Programs, Alternative Approaches

UNIT IV: Reasoning and Inference: Propositional Logic, Propositional Theorem Proving, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Forward Chaining, Backward Chaining, Resolution

UNIT V: Knowledge Representation: Representations and Mappings, Approaches to Knowledge Representation-Simple Relational Knowledge, Inheritable Knowledge, Inferential Knowledge, Procedural Knowledge, Issues in Knowledge Representation, The Frame Problem

Text Books:

1. Artificial Intelligence : A Modern Approach, Stuart J. Russell and Peter Norvig, 3rdEdition, Prentice Hall
2. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rdEdition, Tata McGraw-Hill

Reference Books:

1. Artificial Intelligence, George F Luger, Pearson Education Publications
2. Artificial Intelligence, Saroj Kaushik, 1stEdition, Cengage Learning.

Semester	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20AIL06
Name of the Course	Java Programming Lab					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Demonstrate Programs on Classes, Objects, Constructors and Arrays. **(K3)**
CO2: Demonstrate Inheritance and Exception Handling. **(K3)**
CO3: Implement programs on Multi-Threading and File Handling. **(K3)**
CO4: Implement programs using java collections. **(K3)**

LIST OF EXPERIMENTS

1. Develop programs on Control Structures and Type Conversions in java.
2. Develop programs using various String handling functions
3. Construct programs using the following concepts:
 (a) Classes & Objects b) Usage of static c)Constructors
4. Construct programs using the following concepts.
 (a) Arrays b)Nested Classes c) Command Line Arguments
5. Construct programs using the following concepts.
 (a)Inheritance b) Usage of super c)Method Overriding
6. Construct programs using the following concepts.
 (a)Usage of final b) Abstract class c)Interfaces
7. Implement the programs using the concepts
 (a)Packages b) Exception Handling.
8. Implement the programs on Multi-Threading.
 (a)Multiple Threads on Single Object b) Thread Deadlock
9. Construct a program that shows Inter-thread Communication
10. Construct programs to perform read and write operations on files.
 (a)Sequential Files b) Random Access files
11. Construct program using Array List and perform following operations
 a)Insert b) update c) search d) display
12. Construct program using Linked List and perform following operations
 a)Insert b) update c) search d) display
13. Construct a java program to iterate elements of HashSet using iterator and for Each.

Text Books:

1. The complete Reference Java, 8th Edition, Herbert Schildt, TMH.
2. Introduction to java programming, Y Daniel Liang, 7 Edition, Pearson.

Semester	IV	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20AIL07
Name of the Course	Operating Systems Lab					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Illustrate CPU scheduling algorithms **(K3)**
CO2: Apply Bankers Algorithm for Deadlock Avoidance and Deadlock Prevention **(K3)**
CO3: Use Page replacement algorithms for memory management **(K3)**

LIST OF EXPERIMENTS

1. Demonstrate the following CPU scheduling algorithms:
 - a) FCFS
 - b) SJF
 - c) Round Robin
 - d) Priority
2. Illustrate : fork (), wait (), exec() and exit () system calls.
3. Demonstrate Producer and Consumer problem using Semaphores.
4. Demonstrate Bankers Algorithm for Deadlock Avoidance.
5. Demonstrate Bankers Algorithm for Deadlock Detection.
6. Demonstrate the following page replacement algorithms:
 - a) FIFO b) LRU c) LFU
7. Demonstrate the following File allocation strategies:
 - a) Sequenced b) Indexed c) Linked

Reference Books:

1. Operating System Concepts, Abraham Silberschatz, ,Peter Baer Galvin, Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
3. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007

Semester	IV	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20AIL08
Name of the Course	Artificial Intelligence Lab					
Branch	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After successful completion of the Course, the student will be able to:

- CO1:** Demonstrate uninformed search techniques. **(K3)**
- CO2:** Demonstrate heuristic search techniques. **(K3)**
- CO3:** Solve real world problems by searching. **(K3)**
- CO4:** Develop AI agent for Gaming and AI-powered chatbot. **(K3)**

List of Experiments (Using Python Programming)

1. Solve Water Jug problem using BFS algorithm.
2. Solve Water Jug problem using DFS algorithm.
3. Demonstrate Hill Climbing Algorithm.
4. Demonstrate A* Algorithm.
5. Solve the n-queens problem using backtracking.
6. Solve Travelling Salesman Problem using backtracking
7. Develop Tic-Tac-Toe game
8. Solve8-Puzzle problem
9. Develop a Simple Chatbot.

Reference Books:

1. Artificial Intelligence : A Modern Approach, Stuart J. Russell and Peter Norvig, 3rdEdition, Prentice Hall
2. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rdEdition, Tata McGraw-Hill
3. Artificial Intelligence with Python, Alberto Artasanchez, Prateek Joshi, 2nd Edition, Packt Publishing