CBCS CURRICULAR FRAMEWORK (2020 - 21 ONWARDS)

TABLE 1: B.Sc.(MSDs) Programme SEMESTER - I 2020-21

S.NO	Name of the Course	Course Code	Part No	Type of the Paper	Total Marks	IA TEST	Sem End Exam	Teaching Hours	Credits
1	Business English -I	ENGT15	I	First Language	100	25	75	4	3
2	Telugu-I	TELT11A	I	Second Language	100	25	75	4	3
3	Hindi-I	HINT11							
4	Environmental Studies	CLSCT01	III	Life Skill	50	10	40	2	2
5	Analytical Skills	LSCT03	III	Life Skill	50	10	40	2	2
6	Numerical Analysis & Special Functions	MATT16	II	Core	100	25	75	6	5
7	Descriptive Statisitcs and Theory of Probability	STAT11B	II	Core	100	25	75	4	4
8	Descriptive Statistics Lab	STAP11B	II	Core Lab	50	10	40	2	1
9	Introduction to Python Programming	DSCT11A	II	Core	100	25	75	4	4
10	Introduction to Python Programming Lab	DSCP11A	II	Core Lab	50	10	40	2	1
		TOTAL(Maximum)			700	165	535	30	25

TABLE 2: B.Sc.(MSDs) Programme SEMESTER -II 2020-21

S.NO	Name of the Course	Course Code	Part No	Type of the Paper	Total Marks	IA TEST	Sem End Exam	Teaching Hours	Credits
1	Business English -II	ENGT25	I	First Language	100	25	75	4	3
2	Telugu-II	TELT21A	I	Second Language	100	25	75	4	3
3	Hindi-II	HINT21							
4	National Cadet Crops-I	LSCT09	III	Life Skill	50	10	40	2	2
5	Web Development with Python (Django)	SDCCSCP03	III	Skill Developmen t	50	10	40	2	2
6	Mathematics for Data Science	MATT28	II	Core	100	25	75	6	5
7	Statistical Methods	STAT21B	II	Core	100	25	75	4	4

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8	Statistical Methods Lab	STAP21B	II	Core Lab	50	10	40	2	1
9	Data Structures Using Python	DSCT21A	II	Core	100	25	75	4	4
10	Data Structures Using Python Lab	DSCP21A	II	Core Lab	50	10	40	2	1
11	Community Service Project	CAIP2	II	CSP	100	100	0		4
12	Yoga	CEXP01	IV	Extension Activity	50	10	40	2	2
		TOTAL(Maximum)			850	275	575	32	31

TABLE 3 : B.Sc.(MSDs) Programme SEMESTER -III 2020-21

S.NO	Name of the Course	Course Code	Part No	Type of the Paper	Total Marks	IA TEST	Sem End Exam	Teaching Hours	Credits
1	Business English -III	ENGT02	I	First Language	100	25	75	4	3
2	Personality Enhancement and Leadership	LSCT11	III	Life Skill	50	10	40	2	2
3	Dat Analysis Using MS-Excel Lab	SDCCSCP07	III	Skill Development	50	10	40	2	2
4	Abstract Algebra	MATT31	II	Core	100	25	75	6	5
6	Probability Distributions and Statistical Inference	STAT31B	II	Core	100	25	75	4	4
7	Probability Distributions Lab	STAP31B	II	Core Lab	50	10	40	2	1
8	Applied Statistics	STAT01	II	Core	100	25	75	4	4
9	Applied Statistics Lab	STAP01	II	Core Lab	50	10	40	2	1
9	Elements of R- Programming	DSCT31A	II	Core	100	25	75	4	4
10	Elements of R- Programming Lab	DSCP31A	II	Core Lab	50	10	40	2	1
		TOTAL(Maximum)			750	175	575	32	27

TABLE 4: B.Sc.(MSDCs) Programme SEMESTER -IV 2020-21

CBCS CURRICULAR FRAMEWORK (2020 - 21 ONWARDS)									
S.NO	**Name of the Course**	**Course Code**	**Part No**	**Type of the Paper**	**Total Marks**	**IA TEST**	**Sem End Exam**	**Teaching Hours**	**Credits**
1	Telugu -III	TELT01A	I	Second Language	100	25	75	4	3
2	Hindi-III	HINT01	I						
3	Disaster Management (Self Study)	SDCGT01	III	Skill Developmen t	50	10	40	2	2
4	Introduction to Numpy & Pandas	SDCCSCP11	III	Skill Developmen	50	10	40	2	2
5	Differential Equations	MATT44A	II	Core	100	25	75	6	5
6	Linear Algebra & Matrices	MATT03	II	Core	100	25	75	6	5
7	Sampling Techniques and Design of Experiments	STAT41B	II	Core	100	25	75	4	4
8	Sampling Techniques and Design of Experiments Lab	STAP41B	II	Core Lab	50	10	40	2	1
9	Database Management Systems	DSCT41	II	Core	100	25	75	4	4
10	Database Management Systems Lab	DSCP41	II	Core Lab	50	10	40	2	1
11	Introduction to Java Programming	DSCT01	II	Core	100	25	75	4	4
12	Introduction to Java Programming Lab	DSCP01	II	Core Lab	50	10	40	2	1
13	NCC/NSS/Sports/Extra Curricular	CEXP02	IV	Extension Activity	50	10	40	2	2
15	Inrternship	CAIP4	II	IHP	100	100	0		4
		TOTAL(Maximum)			1000	310	690	40	38

TABLE 5: B.Sc.(M.S.Ds) Programme : SEMESTER - V 2020-21									
S.NO	**Name of the Course**	**Course Code**	**Part No**	**Type of the Paper**	**Total Marks**	**IA TEST**	**Sem End Exam**	**Teaching Hours**	**Credits**
1	Numerical Methods	MATSET01	II	CORE	100	25	75	5	5
2	Mathematical Special functions	MATSET02	II	CORE	100	25	75	5	5
3	Multiple Integrals and Applications of Vector Calculus	MATSET03	II	CORE	100	25	75	5	5

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4	Integral Transforms With Applications	MATSET04	II	CORE	100	25	75	5	5
5	Partial Differential Equations and Fourier Series	MATSET05	II	CORE	100	25	75	5	5
6	Number Theory	MATSET06	II	CORE	100	25	75	5	5
7	Operations Research-I	STASET01	II	CORE	100	25	75	3	3
8	Statistical Data Analysis using SPSS and OR-I	STASEP01	II	CORE LAB	50	10	40	3	2
9	Operations Research-II	STASET02	II	CORE	100	25	75	3	3
10	Statistical Data Analysis using SPSS and OR-II	STASEP02	II	CORE LAB	50	10	40	3	2
11	Regression Analysis	STASET03	II	CORE	100	25	75	3	3
12	Data Analysis using SPSS	STASEP03	II	CORE LAB	50	10	40	3	2
13	Multivariate Techniques	STASET04	II	CORE	100	25	75	3	3
14	Multivariate Data Analysis Using ‘R’	STASEP04	II	CORE LAB	50	10	40	3	2
15	SQC & Reliability	STASET05	II	CORE	100	25	75	3	3

CBCS CURRICULAR FRAMEWORK (2020 - 21 ONWARDS)									
16	SQC & Reliability Lab	STASEP05	II	CORE LAB	50	10	40	3	2
17	Computational Techniques and R Programming	STASET06	II	CORE	100	25	75	3	3
18	Computational Techniques Using Excel & R	STASEP06	II	CORE LAB	50	10	40	3	2
19	Introduction to Machine Learning	DSCSET01	II	CORE	100	25	75	3	3
20	Introduction to Machine Learning Lab	DSCSEP01	II	CORE LAB	50	10	40	3	2
21	Big Data Technology	DSCSET02	II	CORE	100	25	75	3	3
22	Big Data Technology Lab	DSCSEP02	II	CORE LAB	50	10	40	3	2
23	Data Mining and Data Analysis	DSCSET03	II	CORE	100	25	75	3	3
24	Data Mining and Data Analysis Lab	DSCSEP03	II	CORE LAB	50	10	40	3	2
25	Multivariate Technique for Data Analysis	DSCSET04	II	CORE	100	25	75	3	3
26	Multivariate Technique for Data Analysis Lab	DSCSEP04	II	CORE LAB	50	10	40	3	2
27	Data & Information Security through Python	DSCSET05	II	CORE	100	25	75	3	3
28	Data &Information Security through Python Lab	DSCSEP05	II	CORE LAB	50	10	40	3	2
29	Spark Programming	DSCSET06	II	CORE	100	25	75	3	3
30	Spark Programming Lab	DSCSEP06	II	CORE LAB	50	10	40	3	2
		TOTAL(Maximum)			**800**	**190**	**610**	**34**	**30**

TABLE 6: B.Sc.(MSDs) Programme SEMESTER - VI 2020-21

S.NO	Name of the Course	Course Code	Part No	Type of the Paper	Total Marks	Internal Assessment	External Assessment Component	Monitoring Hours	Credits
1	Internship in Statistics	**STAIAP6**	II	Core Project	200	50	150	6	12
2	Internship in Computer Science	**CSCIAP6**							

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Deep Learning LAB

Offered To:	B. Sc (MSDS)	**Course Code:**	DSCP61
Course Type:	Core (Theory)	**Course:**	Deep Learning Lab
Year of Introduction:	2021 – 2022	**Year of offering:**	2021 – 2022
Year of Revision:	-	**Percentage of Revision:**	-
Semester:	VI	**Credits:**	2
Hours Taught:	30 hrs. per semester	**Max. Time:**	3 Hrs

Course Prerequisites (if any): Probability and Statistics, LinearAlgebra
Course Description: Students learn and build the model
Course Objective:
The objective of this lab is to make use of Data sets in implementing the Deep Learning algorithms in any suitable language ofchoice.

Course Outcomes: At the end of this course the student is able to

1. Load Tensorlow and KerasLibraries.(PO5,PO7)
2. Implement ANN inKeras.(PO5,PO7)
3. Implement CNN inKeras(PO5,PO7)

LIST OF EXPERIMENTS

1. Loading Tensor flow & Keras Library in Jupyter Note book inAnaconda.
2. Introduction to kerasLibrary
   a. Loading
   b. Splitting into traintest
   c. Plotting inputdata
3. Building Sequential Model inKeras.
4. Implementing Activation functions, Optimizers, Lossfunctions.
5. Compiling, Fitting, Summarizing theModel.
6. Hand digit Recognition inKeras.
7. Image Classification in Keras.
8. Regression inKeras.
9. Normalization anddropouts.

WEB REFERENCES:

1. http://indexof.es/Varios2/Hands%20on%20Machine%20Learning%20with%20Scikit%20Learn%20and%20Tensorflow.pdf
2. https://playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDataset=reg-plane&learningRate=0.03&regularizationRate=0&noise=0&networkShape=4,2&seed=0.64877&showTestData=false&discretize=false&percTrainData=50&x=true&y=true&xTimesY=false&xSquared=false&ySquared=false&cosX=false&sinX=false&cosY=false&sinY=false&collectStats=false&problem=classification&initZero=false&hideText=false

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Big Data Lab

Offered To:	B. Sc (MSDS)	**Course Code:**	DSCP62
Course Type:	Core (Theory)	**Course:**	Introduction to Deep Learning
Year of Introduction:	2021 – 2022	**Year of offering:**	2021 – 2022
Year of Revision:	-	**Percentage of Revision:**	-
Semester:	VI	**Credits:**	2
Hours Taught:	30 hrs. per semester	**Max. Time:**	3 Hrs

Experiment – 1:

Perform setting up and Installing Hadoop in its three operating modes:

- Standalone, • Pseudo distributed, • Fullydistributed.

Experiment – 2:

Implement the file management tasks in Hadoop.

Experiment – 3:

Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Experiment – 4:

Create a database with name "CustInfo".
Create a customers table with the following fields

Customer Id	int
CustomerName	String
CustomerAge	int
Address	String

Perform the following operations on customerstable:

1. Describe the customerstable
2. Load data of tencustomers
3. Alter table name customers tocustomerdetails
4. Display the details of allcustomers
5. Add column name gender to table

Experiment – 5:

Create a database with name "college".
Create a student table with the following fields

StudentId	int

StudentName	String
StudentAge	int
CourseName	String
Fee	double
City	String
State	String
Pincode	int

Perform the following operations on studenttable:

1. Describe the studenttable
2. Load data of sixstudents
3. Alter table name to“StudentDetails”
4. Add column name **year of joining** totable
5. Display the details of allstudents

Experiment – 6:

Create a database with name “company”.

Create an employee table with the following fields

Employee Id	int
EmployeeName	String
Designation	String
Gender	String
Salary	double
Address	String
City	String
State	String
Pincode	int

Perform the following operations on employeetable:

1. Describe the employeetable
2. Load data of eightemployees
3. Alter table name to“EmpDet”
4. Add column name **department** totable
5. Alter the column name address tocomaddr
6. Display the details of allemployees
7. Add the salary of allemployees

Experiment – 7:

(A) Create a database with name “retail”.

Create a categories table with the followingfields

CategoryIdint

CategoryName	String

Perform the following operations on studenttable:

1. Describe the categoriestable
2. Load data of fivecategories
3. Alter table name to“CategoryDetails”
4. Display the details of allcategories

(B) Create a products table with the following fields

CategoryIdint	
ProductId	int
ProductName	String
ProductDescription	String
ProductPrice	String
ProductImage	String

Perform the following operations on student table:

1. Describe the productstable
2. Load data of eightproducts
3. Alter table name to“ProductDetails”
4. Display the details of allproducts
5. Display the details of products present in second category with categorydescription

Experiment – 8:

Use the database “college”.

Create a book information table with the following fields

Book Id	int
Book ISBNNumber	String
BookTitle	String
AuthorofBook	String
YearofPublication	String
PublisherofBook	String
EditionofBook	String
Book Image	String
Priceof Book	int

Perform the following operations on student table:

1. Describe the book informationtable
2. Load data of tenbooks
3. Alter table name to“BookInfo”
4. Display the details of allbooks
5. Display the details of books of specificpublisher

Experiment – 9:

Create a database with name “online”.

(A) Create an items table with the following fields

ItemId	int
ItemName	String
ItemDescription	String
ItemPrice	String
Item Image	String
Quantity	int

Perform the following operations on student table:

1. Describe the itemstable
2. Load data of tenitems
3. Alter table name to“ItemDetails”
4. Display the details of allitems

(B) Create an orders table

with the following fields Order Id int
OrderName String
OrderDate String
Amount double
ShippingAddress String
ShippingDate String

Perform the following operations on student table:

1. Describe the orderstable
2. Load data of fiveorders
3. Alter table name to“OrderDetails”
4. Display the details of allorders

Experiment – 10:

Create a database with name “university”.

Create a staff table

with the following

fields StaffId int
StaffName String
Designation String
DepartmentName String
DateofJoining String
Gender String
Basic Salary double
CommunicationAddress String
City String
State String
Pincode int
MobileNumber String

Perform the following operations on employee table:

1. Describe the stafftable
2. Load data of ten staffmembers
3. Alter table name to“StaffDetails”
4. Add column name **Qualification** totable
5. Get the data of staff members working in Computer Science indepartment

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Offered To:	B. Sc (MSDS)	**Course Code:**	DSCPW63
Course Type:	Core (Practical)	**Course:**	Project Work
Year of Introduction:	2021 – 2022	**Year of offering:**	2021 – 2022
Year of Revision:	-	**Percentage of Revision:**	-
Semester:	VI	**Credits:**	5
Hours Taught:	30 hrs. per semester	**Max. Time:**	3 Hrs

PROJECT WORK

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

The project is of 2 hours/week for one (semester VI) semester duration and a student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the projectguides.

The project proposal should include the following:

- Title
- Objectives
- Input and output
- Details of modules and processlogic
- Limitations of theproject
- Tools/platforms, Languages to beused

- Scope of future application

The Project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voceexaminations.

Total of 5 reviews will be conducted for max 5 marks each and total of max 25 marks will be considered as internal marks for project. External examination for project work will be conducted for max 75marks.

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Introduction to Deep Learning

Offered To:	B. Sc (MSDS)	**Course Code:**	DSCT61
Course Type:	Core (Theory)	**Course:**	Introduction to Deep Learning
Year of Introduction:	2021 – 2022	**Year of offering:**	2021 – 2022
Year of Revision:	-	**Percentage of Revision:**	-
Semester:	VI	**Credits:**	3
Hours Taught:	60 hrs. per semester	**Max. Time:**	3 Hrs

Course Prerequisites (if any): Machine Learning and Python
Course Description: Students Learn ANN and CNN

Course Objective: Students are able to implement projects by implementing ANN, CNN in Deep Learning

Course Outcomes: At the end of this course the student is able to

1. To acquire basic concepts of Neural Networks.
2. To acquire basic concepts of ANN.
3. To enables students to gain experience by building ANN with Keras.
4. To acquire basic concepts of CNN.
5. To understand ANN and CNN Deep Learning.

1. **Identify** the idea behind Neural Networks.**(PO5,PO7)**
2. **Summarize** ANN Architecture.**(PO5,PO7)**
3. **Apply** ANN withKeras.(**PO5,PO6,PO7**)
4. **Summarize** CNNArchitecture.**(PO5,PO7)**
5. **Apply** CNN withKeras.**(PO5,PO6,PO7)**

Syllabus		
Unit	**Learning Units**	**Lecture Hours**
I	**Introduction to Deep Learning:** Deep Learning Vs Machine Learning. Inspiration of Neural Networks from Brain. The Perceptron: the simple idea behind neural networks. Artificial Neuron and its Architecture. Input and output layers in neural networks. Activation functions. Loss Functions, Optimizers.	14
II	**Artificial Neural Networks**: Architecture. Input and output layers in neural networks. Activation functions specified to ANN. Loss Functions specified to ANN. Optimizers specified to ANN. Training a neural net. Feed Forward Mechanism. Backpropagation in neural networks. Gradient Descent Algorithm. Updating weights and biases.	10
III	**Introduction to Tensorflow and Keras:** Building ANN with Keras. Problems of vanishing gradient and exploding gradient. Modifications to neural networks. Regularization, Normalization, Dropouts. Hand Digit Recognition in keras. Regression with neural networks	10
IV	**Introduction to Convolution Neural Networks (CNN):** Meaning of Convolution. Architecture of CNN. Filters, Padding, Data Preprocessing in CNN. Alexnet, Googlenet. Image Classification with CNN using Keras. Transfer Leaning in CNN.	12
V	**Case Studies on Deep Learning**:ANN and CNN	12

Text Books:			
	Author	**Title**	**Publisher**
1	François Chollet	**Deep Learning with Python**	**Manning**

Reference Books:			
	Author	**Title**	**Publisher**
1	Aurelien Geron	Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems	O'Reilly
2	Peter Bruce	Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python	O'Reilly

Course Delivery method: Face-to-face / Blended

Course has focus on: Skill Development, Employability

Websites of Interest:

1. https://in.mathworks.com/campaigns/offers/deep-learning-with-matlab.html?ef_id=EAIaIQobChMI1_KAuZjv9QIVxZlmAh00DQGcEAAYASAAEgIk3vD_BwE:G:s&s_kwcid=AL!8664!3!281794527284!p!!g!!deep%20learning&s_eid=psn_57384022752&q=deep%20learning&gclid=EAIaIQobChMI1_KAuZjv9QIVxZlmAh00DQGcEAAYASAAEgIk3vD_BwE
2. https://youtu.be/yuVTAZL5BRQ?list=PLOzRYVm0a65cTV_t0BYj-nV8VX_Me6Es3&t=94
3. https://youtu.be/yuVTAZL5BRQ?list=PLOzRYVm0a65cTV_t0BYj-nV8VX_Me6Es3&t=146

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INTRODUCTION TO DEEP LEARNING

MODEL QUESTION PAPER FOR SEM END EXAMINATION

TITLE: Introduction to DeepLearning COURSECODE:DSCT61
CLASS:MSDS SEMESTER:VI
TIME:3Hrs. MAX:75M

SECTION –A

ANSWERANY<u>FIVE</u>QUESTIONS 5 X 5 =25 M.

1. Define Deep Learning. Explain, how it is different from Machine Learning?{CO1,L2}
2. What is meant by Perceptron? Explain its Architecture.{CO1,L2}
3. What is meant by Activation Function? What is the goal in Neural Networks?{CO2,L2}
4. What is a Loss Function? Examine its role in Neural Networks.{CO2,L2}
5. What is meant by Gradient Descent Algorithm?{CO3,L2}
6. Briefly explain about Keras Library.CO3,L2}
7. Write a short note on Vanishing Gradient.{CO4,L2}
8. Explain Convolution Neural Networks.{CO5,L2}

SECTION – B

ANSWERALLTHEQUESTIONS 5 X 10 =50 M

9. (A) What is a Neuron? Explain the Architecture of Neuron in Human brain.{CO1,L2}

(OR)

(B) Examine Architecture of a simple Neural Networks with 1 input, 1 hidden and 1 output layer.
{CO1, L2}

10. (A) What is Feed Forward Mechanism in ANN? Explain with an examples.{CO2,L2}

(OR)

(B) Explain the process of training an ANN with an example. {CO2, L2}

11. (A)What is Back Propagation in Neural Networks? Explain, how weights and biases areupdate?
{CO3,L2}

(OR)

(B) Write Keras Pseudocode for Hand Digits Recognition problem. {CO3,

L2}

12. (A) What are the modifications to Neural Networks to improve the accuracy ofthe Network?{CO4,L2}

(OR)

(B) What is meant by Convolution Neural Networks? Explain the Architecture of CNN.

{CO4, L2}

13. (A) Explain the concepts of Convolution, Padding, and Normalization in CNNArchitecture.{CO5,L2}

(OR)

(B) Write Pseudocode for Image Classification of Fashion_Analyst data in Keras {CO5, L2}

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BIG DATA TECHNOLOGY

Offered To:	B. Sc (MSDS)	**Course Code:**	DSCT62
Course Type:	Core (Theory)	**Course:**	Big Data Technology
Year of Introduction:	2021 – 2022	**Year of offering:**	2021 – 2022
Year of Revision:	-	**Percentage of Revision:**	-
Semester:	VI	**Credits:**	3
Hours Taught:	60 hrs. per semester	**Max. Time:**	3 Hrs

Course Prerequisites (if any):

Course Description: Students Learn about Big data Technology

Course Objective:

1. To Understand big data, types of big data and applications in bigdata
2. To understand the map reduce concepts and scaling map reduce word count program
3. To understand the Concepts of HadoopEcosystem
4. To learn file commands in HDFS and concepts of mapper and reducer
5. To learn Hive queries and concepts ofYARN

Course Outcomes: At the end of this course the student is able to

COURSE OUTCOMES	Upon successful completion of this course, students should have the knowledge and skills to:	PROGRAM OUTCOMES
CO_1	Recognize and understand use and applications of big data and analytics.	PO1,PO7
CO_2	Learn how to apply Map reduce.	PO1,PO7
CO_3	Understand Hadoop ecosystem components.	PO1,PO7
CO_4	Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop.	PO1,PO7
CO5	Able to use Hive as an interface to access data in Hadoop.	PO1,PO7

Syllabus		
Unit	**Learning Units**	**Lecture Hours**
I	**IntroductiontoBigdata:**WhatisBigData,StructuringBigData-TypesofBig Data, Elements of big data- Volume, Velocity, Variety, Veracity, Big Data Analytics- Advantages of Big Data Analytics, Big Data Applications.	12
II	**IntroductiontoHadoop:**WhatisHadoop,Understandingdistributedsystems& Hadoop, Comparing SQL databases and Hadoop, Understanding Map Reduce-scaling word count program manually, scaling word count program in Mapreduce.	12
III	Hadoop Eco System, HDFS-HDFS Architecture, concept of blocks in HDFS-namenode, datanode, secondary namenode, job tracker, task tracker). Introducing HBase-HBase architecture, Regions, storing Big Data with HBase, Why hive, pig, scoop, zookeeper, flume, oozie.	12
IV	**Working with files in HDFS**-Basic file commands, reading & writing to HDFS programmatically, Anatomy of Map Reduce program-Hadoop data types, Mapper, Reducer, Partitioner, Combiner, word counting with pre-defined mapper and Reducer, Reading & Writing-input format, output format.	12
V	Background of YARN, limitations of map reduce, advantages of YARN, YARN architecture , working of YARN. Introducing Hive, Hive Services, Hive Variables, Hive Queries, Data types, Hive Built in functions, Hive - DDL, DML, and Data Retrieval Queries.	12

Text Books:			
	Author	**Title**	**Publisher**
1	Black Book	BIG DATA (covers hadoop2, map reduce, Hive, Yarn, Pig, R and Data Visualization)	DreamTech Press. **(Units – 1,3, 5)**
2	Chuck Lam	Hadoop in Action	DreamTech Press**(Units – 2,4)**

Reference Books:			
	Author	**Title**	**Publisher**
1	Boris lublinsky, Kevin t. Smith, Alexey Yakubovich	Professional HadoopSolutions	Wiley,2015
2	Chris Eaton, Dirk deroos et al.	Understanding Big data	McGraw Hill,2012

Course Delivery method: Face-to-face / Blended **Course has focus on:** Skill Development, Employability **Website of Interest:**

1. https://www.tutorialspoint.com/big_data_tutorials.htm

P.B.SIDDHARTHA COLLEGE OF ARTS AND SCIENCE:: VIJAYAWADA
TITLE: BIG DATA TECHNOLOGY

COURSECODE:DSCT62 **Max. Marks: 75M**
CLASS: IIIB.Sc. (MSDS) **Time: 3Hours**

SEMESTER-VI

Section-A

ANSWER ANYFIVEQUESTIONS **5x5M=25M**

1. Write a short note on elements of Big Data.(CO1,L5)
2. Write down the advantages of Big Data Analytics.(CO1,L5)
3. Differentiate between SQL database and Hadoop.(CO2,L2)
4. List and explain the components ofHadoop(CO2,L2)
5. Write a short on Hadoop Ecosystem(CO3,L5)
6. Explain data types in Hadoop.(CO4,L2)
7. Explain advantages of YARN over Map Reduce.(CO5,L2)
8. List out the data types present in hive.(CO5,L1)

Section-B

ANSWER THEFOLLOWINGQUESTIONS **5x10M=50M**

9. (A) Define Big Data? Explain different types of Big Data.(CO1,L2)
   OR
   (B) Discuss the applications of Big Data in detail. (CO1,L4)

10. (A) Define Hadoop? Explain the history of Hadoop in detail.(CO2,L2)
    OR
    (B) Explain Map Reduce word count program with example. (CO2,L2)

11. (A) Define HDFS? Explain different blocks of HDFS in detail.(CO3,L2)
    OR
    (B) Define HBase? Explain the architecture of HBase. (CO3,L2)

12. (A) Explainthe following (CO4,L2)
    i) Mapper 5M
    ii) Reducer 5M
    OR
    (B) Illustrate basic file commands in HDFS with examples (CO4,L3)

13. (A) Describe YARN architecture and Working with YARN.(CO5,L2)
    OR
    (B) Explain hive DDL commands with examples. (CO5,L2)

Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
VI	MAT T64	CORE	ADVANCED NUMERICAL ANALYSIS	100	25	75	5	5

Course Outcomes of MAT T64

S. No	C.O Upon successful completion of this course, students should have the knowledge and skills to:	Mapping
1.	To understand the curve fitting for various polynomials.	L1, PO –1
2.	Able to Calculate the value of the derivative of a function at some assigned value using different methods.	L2, PO – 1
3.	Use Trapezoidal rule, Simpson's rule to approximate the value of a definite integral to a given accuracy.	L1, PO – 1
4.	Solve systems of linear equations using Matrix inversion method, and Gauss-Jordan method.	L2, PO – 1
5.	To find Numerical solution of ordinary differential equations using Taylor's series, Picard's method and Euler's method.	L3, PO – 1

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1					**H**		
CO2						**M**	
CO3							**M**
CO4							**M**
CO5							**L**

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE::VIJAYAWADA-10.

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	MAT T65	2021 – 22 Onwards	B.Sc. (MSDS)

ADVANCED NUMERICAL ANALYSIS

SEMESTER-VI No of Credits: 5

OBJECTIVE: TO ENHANCE THE COMPUTATIONAL SKILLS & APPLICATION SKILLS.

UNIT-I: **CURVE FITTING** **(15 hrs.)**

1.1. Introduction.
1.2. Method of Least –Squares.
1.3 Fitting of a Straight line.
1.4. Fitting of a second-degree polynomial.
1.5 Fitting of exponential curves like $y = ae^{bx}$ and $y = ab^{x}$

UNIT-II: NUMERICAL DIFFERNTIATION **(15 hrs.)**

2.1. Problems on Derivatives Using Newton's Forward Difference Formula
2.2. Problems on Derivatives Using Newton's Backward Difference Formula
2.3. Problems on Derivatives Using Stirling's interpolation formula
2.4. Problems on Derivatives Using Newton's divided formula

UNIT-III: NUMERICAL INTEGRATION **(15 hrs.)**

3.1. General Quadrature Formula
3.2. Trapezoidal Rule and Related Problems.
3.3. Simpson's $1/3^{rd}$ Rule and Related Problems.
3.4. Simpson's $3/8^{th}$ rule and Related Problems.
3.5. Weddle's rule and Related Problems.

UNIT-IV: SOLUTIONS OF SIMULTANEOUS LINEAR SYSTEMS OF EQUATIONS (15hrs)

4.1. Solution of Linear Systems
4.2. Matrix Inversion Method Problems only.
4.3. Gauss's Jordan Method Problems only.

UNIT-V: (NUMERICAL SOLUTION OF ORDINARY DIFFERNTIAL EQUATIONS) (15 hrs.)

5.1. Introduction
5.2 Taylor's Series Method Problems only.
5.3 Picard's Method of Successive Approximations Problems only.
5.4. Euler's Method Problems only.

Prescribed Text book:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	S.S.Sastry	Numerical Analysis	Prentice Hall of India Private Limited.	1999

Reference Text books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Gupta & Malik	Calculus of Finite Differences and Numerical Analysis	Krishna PrakashanMandir – Meerut	1992
2.	G.Shankar Rao	Numerical Analysis	New Age International Publishers.	2010

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE:: VIJAYAWADA-10.
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SEMESTER – VI **Model Paper**
COURSE CODE : MAT T65 Time: 3hrs.
TITLE OF THE PAPER : ADVANCED NUMERICAL ANALYSIS Max. Marks: 75

Answer any **TEN** choosing at least **THREE**from each section.**10 x7.5 =75M**

SECTION-A

1.Find a Formula for the line of the form $y=a+bx+Cx^2$ which will fit the following data (CO1,L1)

X:	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
Y:	3.1950	3.2299	3.2532	3.2611	3.2611	3.2282	3.1807	3.1266	3.0594

2.Find the least square line for the data points(1,10), (0,9),(1,7),(2,5) ,(3,4), (4,3), (5,0) and (6,-1) (CO1,L1)

3. Find the least square line y = a+ bx for the data (CO1,L1)

X_r	-2	-1	0	1	2
Y_r	1	2	3	3	4

4.Finddy/dx at x=0.6 of the function y=f(x), tabulated below (CO2,L2)

X	0.4	0.5	0.6	0.7	0.8
Y	1.5836494	1.7974426	2.0442376	2.3275054	2.651081

By using Stirling's Formula

5. Find dy/dx at x=1 (CO2,L2)

x	1	2	3	4	5	6
y	1	8	27	64	125	216

Also find d^2y/dx^2at x=1

6. From the Following table find x correct to two dcimal places, for which y is maximum and find this value of y. (CO2,L2)

x	1.2	1.3	1.4	1.5	1.6
y	0.9320	0.9636	0.9855	0.9975	0.9996

SECTION-B

7. Derive Simpson's 1/3 rd rule. (CO3,L1)

8. Find the value of $\int_0^1 \frac{dx}{1+x}$ taking 5 sub intervals by Trapezoidal rule, Correct to five Significant figures. (CO3,L1)

9. Find the value of $\int_4^{5.2} logx$ dx by Weddle's rule. (CO3,L1)

10. Solve the system of Equations by Matrix inversion Method (CO4,L2)
$x_1+x_2+x_3=1$, $x_1+2x_2+3x_3=6$, $x_1+3x_2+4x_3=6$.

11. Solve the System $2x+y+z=10, 3x+2y+3z=18, x+4y+9z=16$ by Gauss-Jordan Method (CO4,L2)

12. Solve the equation $2x+3y+z=9, x+2y+3z=6, 3x+y+2z=8$ by LU decomposition. (CO4,L2)

13. Given the differential equation $\frac{dy}{dx}=\frac{x^2}{y^2+1}$ with the initial condition y=0, when x=0. use Picard's method to obtain y for x=0.25,0.5 and 1.0 correct to three decimal places. (CO5,L3)

14. Given dy/dx=1+xy with the initial condition that y=1, when x =*0.* Compute *y (0.1)* correct to four places of decimal by using Taylor's series method. (CO5,L3)

15. Solve the equation $\frac{dy}{dx} = 1 - y$ with the initial condition y = 0, when X = 0 using Euler's algorithm and tabulate the solutions at $x = 0.1, 0.2, 0.3$. (CO5,L3)

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Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
VI	MAT T65	CORE	Ring theory & Vector Calculus	100	25	75	5	5

Course Outcomes of MAT T65

S. No	C.O Upon successful completion of this course, students should have the knowledge and skills to:	Mapping
1.	Understand the fundamental concepts of rings and its properties, fields, integral domains and subrings.	L1, PO –1
2.	Appreciate the significance of maximal &prime ideals	L2, PO – 1
3.	Determine and apply, the important quantities associated with scalar fields, such as partial derivatives of all orders, the gradient vector and directional derivative.	L2,PO – 1
4.	Evaluate line, surface and volume integrals	L2, PO – 1
5.	To verify the seminal integral theorems (Green's theorem in the plane, Gauss' divergence theorem and Stokes' theorem)	L3, PO – 1

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1					**H**		
CO2					**H**		
CO3						**M**	
CO4							**M**
CO5							**M**

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE::VIJAYAWADA-10.

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	**MAT T65**	**2021 – 22 Onwards**	**B.Sc. (MSDS)**

RING THEORY & VECTOR CALCULUS

SEMESTER-VI **No of Credits: 5**

OBJECTIVE: TO ENHANCE THE COMPUTATIONAL SKILLS AND APPLICATIONAL SKILLS AND MEMORY POWER OF STUDENTS.

UNIT – 1: RINGS& SUB RINGS: (15 hrs)

1.1 Definition of Ring and basic properties, Boolean Rings
1.2 Divisors of zero and cancellation laws in a Ring, Integral Domains, Division Ring and Fields
1.3 The characteristic of a ring – Definition – Theorems.
1.4 Sub Rings – theorems- related problems.

UNIT – 2: IDEALS & HOMOMORPHISMS. (15 hrs)

2.1 Ideals and Principal ideals – theorems and related problems.
2.2 Maximal Ideals & Prime Ideals.
2.3 Definition of Homomorphism, types of Homomorphism, Elementary Properties of Homomorphism.
2.4Homomorphic image – theorems- related problems.
2.5 Problems on Homomorphisms and Isomorphisms.
2.6 Kernel of a Homomorphism – Fundamental theorem of Homomorphism.

UNIT –3: VECTOR DIFFERENTIATION (15 hrs)

3.1 Vector point function – definition – ordinary derivatives of vectors and properties.
3.2 Vector differential operator ∇ , gradient of a scalar point function – properties – problems on grad f.
3.3 Divergence & Curl operators – Solenoid & Irrotational vectors – related problems.
3.4 Vector identities – related problems.

UNIT – 4: VECTOR INTEGRATION (15 hrs)

4.1 Definition of Line Integral – related problems.
4.2 Definition of Surface Integral – related problems.
4.3 Definition of Volume integral – related problems.

UNIT – 5: APPLICATIONS OF VECTOR INTEGRATION (15 hrs)

5.1 Green's theorem in a plane – related problems
5.2 Gauss Divergence theorem – related problems.
5.3 Problems on Stoke's theorem only.

Prescribed Text books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	V. Venkateswara Rao, N. Krishna Murthy.	A text book of mathematics for B.A / B.Sc Volume – II (Unit – II). Pg: 187 - 290	S-Chand& Co	2014
2.	V. Venkateswara Rao, N. Krishna Murthy	A text book of mathematics for B.A / B.Sc Volume – III (Unit – III & IV). Pg: 227 - 385	S-Chand& Co	2012

Reference books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr. A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – III	Deepthi Publications	3rd Edition 2006 – 2007
2	Dr. A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	4th Edition 2004 – 2005
3	A.R. Vashistha& A.K Vashistha	Modern Algebra	Krishna Prakashan Media Ltd.	2007

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE:: VIJAYAWADA-10.
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SEMESTER – VI **Model Paper**

COURSE CODE : MAT T **Time: 3hrs.**

TITLE OF THE PAPER: RING THEORY & VECTOR CALCULUS **Max. Marks: 75**

Answer any **TEN** choosing at least **THREE** from each section. **10 x7.5 =75M**

SECTION – A

1. Show that Q ($\sqrt{2}$) = {a+b ($\sqrt{2}$)$/a, b \in Q\}$ *is a Field* (CO1, L1)
2. Prove that characteristic of an integral domain is either zero or prime. (CO1, L1)
3. If R is a Ring and S_1, S_2 are two subrings of R, then prove that $S_1 \cup S_2$ is a subring of R iff either $S_1 \subseteq S_2$ or $S_2 \subseteq S_1$ (CO1, L1)
4. An ideal S of a commutative ring R with unity is a maximal ideal $\Leftrightarrow \frac{R}{S}$ is a field. (CO2, L2)
5. State and Prove Fundamental theorem of Homomorphism. (CO2, L2)
6. If R is a commutative ring with unit element and M is an ideal of R then prove that M is maximal ideal of R ⇔R/M is field. (CO2, L2)

SECTION – B

7. Find the directional derivative of $\varnothing = x^2 - 2y^2 + 4z^2$ at (1, 1, -1) in the direction of $2i + j - k$. (CO3, L2)
8. If $\bar{A}, \bar{B}$ are differential vector point functions, then show that (CO3, L2)
   $i) div(\bar{A} X \bar{B}) = \bar{B}.curl\bar{A} - \bar{A}.curl\bar{B}$
   $ii) curl(\bar{A} X \bar{B}) = \bar{A}(div\bar{B}) - \bar{B}(div\bar{A}) + (\bar{B}.\nabla)\bar{A} - (\bar{A}.\nabla)\bar{B}.$
9. Prove that grad ($\vec{A}$. $\vec{B}$)= $\left(\vec{A} \times curl\vec{B}\right) + \left(\vec{B} \times curl\vec{A}\right) + \left(\vec{A}.\nabla\right).\vec{B} + \left(\vec{B}.\nabla\right).\vec{A}$ (CO3, L2)
10. Evaluate $\int_s \bar{F}.Nds$, where $\bar{F} = zi + xj - 3y^2zk$ and S is the surface $x^2 + y^2 = 16$ included in the first octant between Z=0 and Z=5. (CO4, L2)
11. If $\bar{F} = (2x^2 - 3z)i - 2xyj - 4xk$, then evaluate i) $\int_v div\,\bar{F}\,dv$ ii) $\int_v curl\,\bar{F}\,dv$, where V is the closed region bounded by x=0, y=0, z=0, 2x+2y+z = 4. (CO4, L2)

12. If $F = x^2y^2\vec{i} + y\vec{j}$ and the curve c is $y^2 = 4x$ in the xy-plane from (0,0) to (4,4) (CO4, L2)

13. State and Prove Gauss Divergence theorem. (CO5, L3)

14. State and Prove Green's theorem (CO5, L3)

15. Verify Stoke's theorem for the function $\bar{F} = x^2 i + xyj$ integrated round the square in the plane Z=0, whose sides are along the line x=0, y=0, x=a, y=a. (CO5, L3)

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous - ISO 9001 – 2015 Certified

Statistical-Data Analysis suing SPSS and Advance Operations Research Models

Offered to: B.SC (MSCA) / STAP63
Course Type: Core (Practical)
Year of Introduction: 2017 **Percentage of Revision: Nil**
Semester: VI **Paper No. VIII** **Credits: 2**
Hours Taught: 30periods. per Semester **Max.Time: 2** Hours
Course Prerequisites (if any): Student required basic knowledge in computers
Objective

The objective of this paper is to introduce the students to at least one of the popular Statistical Software Package (SPSS) that are commonly used. The paper shall provide them with an overview of the application and the different computational facilities provided in the package

Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	To Apply statistical analysis that can test hypotheses under Parametric and Non Parametric approaches.	PO – 6
CO 2	To Compute the optimal solutions of the various operation research problem used in real life situations	PO – 7

CO-PO MATRIX							
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
STAP63	**CO1**						
	CO2						
	CO3						
	CO4						

	CO5						

List of practical's

1) t- test – One sample , Independent samples and paired t- test
2) ANOVA- One way and Two-Way Classification, Multiple comparison tests.
3) Chi-Square Test- Test of independence and Goodness of fit.
4) Statistical Quality Control – Construction of Mean, Range and C- Charts
5) Construction of the PERT network, calculation of expected completion time for the project using Critical path method.
6) Solution of games by Simplex method.
7) Algebraic method for the solution of general game.
8) Queuing problems based on the Model (M/M/1):(∞ /FIFO

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous -ISO 9001 – 2015 Certified

Optimization Techniques using R

Offered to: B.SC (MSDS) / STAP66 **Course Type:** Core (Practical)
Year of Introduction: 2021 **Percentage of Revision: Nil**
Semester: VI **Paper No. VIII** **Credits: 1**
Hours Taught: 30periods. **Max.Time: 2** Hours

Title of the course : **Optimization Techniques using R**

Course Outcome	**Course:** STAP66 Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	Solve the linear programming problems by using the simplex and big-M methods.	PO6
CO 2	Calculating the transportation and assignments problems in minimization and maximization cases.	PO5
CO3	Analyzing the results of linear programming problems of simplex and big-Methods by using R.	PO6
CO 4	Analyzing the results of linear programming problems of assigement and transportation Methods by using R.	PO6
CO 5	Analyzing the results of queuing model by using R.	PO6

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAP66	**CO1**						**H**	
	CO2					**H**		
	CO3						H	
	CO4						**H**	
	CO5						**H**	

List of Practical's

Practical No	Theme	Key Topics
Manual		
1	**Linear Programming Problem – I**	Simplex Method
2	**Linear Programming Problem – II**	Big – M method
3	**Transportation Problem**	Minimization and Maximization – Balanced and Unbalanced
4	**Assignment Problem**	Minimization and Maximization – Balanced and Unbalanced
using R – Package		
5	**Linear Programming Problem**	Simplex, Big M
6	**Transportation Problem**	Minimization and Maximization – Balanced and Unbalanced
7	**Assignment Problem**	Minimization and Maximization – Balanced and Unbalanced
8	**Queuing Model**	(M/M/1) : (∞/FIFO)

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous -ISO 9001 – 2015 Certified

Time Series Analysis

Offered to:B.Sc(MSDs)/ STAT65 **Course Type:** Core (Theory) **Year of Introduction:2022**

Percentage of Revision: Nil **Semester: VI** **Paper No. VII** **Credits: 4**

Hours Taught: 60periods per Semester **Max.Time: 3** Hours

Course Outcomes		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	Programme Outcomes Mapping
CO 1	To know the basic differences between the components of a time series and its applications.	PO - 5
CO 2	Knowledge and importance of trend. Measurement of trend and its estimation	PO - 6
CO3	The computation skills to calculate and estimate the seasonal component and Deseasonalistion	PO – 7
CO 4	Knowledge and importance of Cyclical component and on some of its measures.	PO - 6
CO 5	Knowledge and importance of Random component and some of Forecasting measures.	PO - 7

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAT65	**CO1**					**H**		
	CO2						**L**	
	CO3							M
	CO4						**M**	
	CO5							**H**

Syllabus

Unit	Learning Units	Lecture Hours
I	**Introduction to analysis of Time Series** Introduction time series data, applications of time series data from various fields, Components of a time series data, Models of time series data, Decomposition of time series data .	**12**
II	**Analysis of Trend** Estimation of trend by Method of curve fitting by principle of least squares, growth curves and moving averages. Detrending of a time series data	**12**
III	**Analysis of Seasonal Component** Estimation of seasonal component by the methods of – simple averages, Ratio to trend, Ratio to moving average, and Link Relative method. Deseasonalistion of the data.	**12**
IV	**Analysis of Cyclic Component** Residual method, Harmonic analysis, Auto- Regression series: Second order Auto- Regressive series (Yule's series) Auto Correlation and Correlogram, Correlogram of Moving average, Correlogram of Harmonic series, Correlogram of Auto Regressive Series.	**12**
V	**Analysis of Random Componentand Forecasting** Variate difference method, Introduction to methods of forecasting a time series analysis, forecasting by the method of Exponentional smoothing. Introduction of ARMA and ARIMA models	**12**

TEXT BOOK:

1. S.C. Gupta and V.K.Kapoor(2019), Seventh Edition, Fundamentals of Applied Statistics, Sultan chand and Sons Publications
2. Probability and Statistics Dr.D.Biswas, New central publications

REFERENCE BOOKS

1. Sharma, J. K. (2013), *Business statistics*, New Delhi: Pearson Education
2. Levine, D.M., Berenson, M. L. & Stephan, D. (2012*), Statistics for managers using Microsoft Excel*, New Delhi: Prentice Hall India Pvt.
3. Aczel, A. D. &Sounderpandian, J. (2011), *Complete Business Statistics*, New Delhi: Tata McGraw Hill.
4. Anderson, D., Sweeney, D., Williams, T., Camm, J., & Cochran, J. (2013), *Statistics for Business and Economics*, New Delhi: Cengage Learning.

5. Davis, G., &Pecar, B. (2014), *Business Statistics using Excel*, New Delhi: Oxford University Press.

Websites of Interest: http://onlinestatbook.com/rvls/index.html

Co-Curricular Activities in the class:

1. Pictionary
2. Case Studies on topics in field of statistics
3. Snap test and Open Book test
4. Architectural – To be build the procedures
5. Extempore – Random concept to students
6. Interactive Sessions
7. Teaching through real world examples

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Model Question Paper Structure for SEE

Max.: 75 Marks **COURSE CODE STAT65** **Min.Pass : 30 Marks**

Section – A

Answer any five of the following Questions **5 x 5M = 25 Marks**

1. Define time series and write its uses (CO-1,L-1)
2. Explain the models of time series analysis (CO-1,L-1)
3. Define trend and its uses (CO-2,L-1)
4. The linear trend of sales of accompany is Rs.. 6,50,000 in 1995 and it rises by Rs. 16,500 per year(i) Write down the trend equation(ii) If the company knows that its sales in1998 will be 10% below the forecasted trend sales, find Its expected sales in 1998.(CO-2,L-1)
5. What is moving average? What are its uses in analysis of time series? (CO-3,L-1)
6. Calculate three yearly moving averages for the following data and comment on the results (CO-3,L-1)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
production	242	250	252	249	253	255	251	257	260

7. Define auto correlation and Correlogram (CO-4,L-1)
8. Write very short note on exponential smoothing (CO-5,L-1)

Section – B

Answer the following Questions **5 x 10M = 50 Marks**

9. (a) Explain various components of time series analysis(CO-1,L-2)

(OR)

(b) Below are given the figures of production (in thousand tons) of sugar factory(CO-1,L-3)

Year	1999	2000	2001	2002	2003	2004	2005
Production	77	88	94	85	91	98	90

(i) What is monthly increase in production?

(ii) Eliminate the trend values by using both additive and multiplicative model.

10. (a) Fit a trend function $y = ab^x$ to the following data and also find the estimated trend Values(CO-2,L-3)

X	1	2	3	4	5
y	1.6	4.5	13.8	40.2	125

(OR)

(b) Find the trend of annual sales of a trading organization by moving average method (use the most appropriate period of moving average) (CO-2,L-3)

Year	Annual Sales('000)		Year	Annual Sales('000)
1980	40		1990	42
1981	42		1991	48
1982	40		1992	46
1983	44		1993	52
1984	49		1994	58
1985	46		1995	56
1986	42		1996	51
1987	44		1997	57
1988	44		1998	54
1989	50		1999	63

11. (a) The following table gives the information related to the production of coal in million of tons. Calculate the seasonal indices by the ratio to trend method(CO-3,L-3)

year	Production of coal(in million of tons)			
	Q_1	Q_2	Q_3	Q_4
1	68	60	61	63
2	70	58	56	60
3	68	63	68	67
4	65	56	56	62

5	60	55	55	58

(OR)

(b) The following table shows the information related to the prices of wheat in rupees per 10 kg calculate the seasonal indices by the Link Relatives method(CO-3,L-3)

Querter / year	Production of coal(in million of tons)			
	2002	2003	2004	2005
Q_1	75	86	90	100
Q_2	60	65	72	78
Q_3	54	63	66	72
Q_4	59	80	85	93

12. (a) Obtain the cyclical components to the following data by using Residual method (CO-4,L-3)

Year	2018				2019				2020			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Original data(y_t)	274.4	262.4	224.9	284.1	261.9	233.5	190.6	274.3	281.4	243.4	218	335.6
Seasonal Indices (S)	108	96	82	114	108	96	82	114	108	96	82	114

(OR)

(b) Explain the concept of Correlogram of Auto Regressive Series(CO-4,L-2)

13. (a) Find the variance of the random component in the following series by Variate Difference Method.(CO-5,L-3)

t	1	2	3	4	5	6	7	8	9
y_t	106	118	124	94	82	88	87	88	88
t	10	11	12	13	14	15	16	17	18
y_t	68	98	115	135	104	96	110	107	97
t	19	20	21	22	23	24	25		
y_t	75	86	111	125	78	86	102		

(OR)

(b) Explain the various methods of forecasting a time series analysis.(CO-5,L-2)

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Operations Research for Data Science

Offered to: B.Sc (MSDS) / STAT66 **Course Type:** Core (Theory) **Year of Introduction: 2022**

Percentage of Revision: Nil **Semester: VI** **Paper No. VIII** **Credits: 4**

Hours Taught: 60periods. per Semester **Max.Time: 3** Hours

Title of the Course: Operations Research for Data Science		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	To understand the principles of linear programming problems.	PO – 5
CO 2	To compute optimal solutions of linear programming problems	PO – 6
CO3	To analyze the optimization techniques of linear programming, network analysis in solving real world problems.	PO – 6
CO 4	To evaluate the concepts in Queuing models.	PO – 7
CO 5	To design a mathematical model for simulation models in real life data.	PO – 7

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAT66	**CO1**					**H**		
	CO2						**M**	
	CO3						M	
	CO4							**L**
	CO5							**M**

Syllabus

Unit	Learning Units	Lecture Hours
I	**Operations Research -** Origin and development of O.R., Nature and features of O.R., Scientific method and Modeling in O.R., Advantages and limitations of models, Applications, Opportunities and Shortcomings of O.R. **Linear Programming Problem** - Definition, components, basic assumptions Mathematical formulation of the problem, Illustrations on mathematical formulation. Graphical solution method. Simplex,Big*M* or Method of Penalties and Two-phase Methods..	**12**
II	**Transportation Problem –L.P**P. formulation of the Transportation Problem,Initial Basic Feasible Solution(I.B.F.S.) to Transportation Problem- North West Corner , Least Cost and Vogle's approximation Methods. The Optimality Test - Transportation Algorithm - MODI (Modified Distribution Method), Simple problems. **Assignment Problem -**Mathematical formulation of the problem, Hungarian method for solving balanced assignment problem. Solving of Unbalanced, Maximization,Simple problems	**12**
III	**Network Scheduling by PERT/CPM**: Basic components, Logical sequencing (errors in drawing networks). Rules for network construction, Basic steps in PERT/CPM techniques. Critical path analysis. Method. Probability considerations in PERT (Project Evaluation and Review Technique). Distinction between PERT and CPM, Crashing. Applications of network techniques.	**12**
IV	**Queuing Theory**: Queuing system, Elements of a queuing system, Operating characteristics of a queuing system. Probability distributions in queuing systems - Distribution of arrivals the Poisson process, distribution of departures Exponential Process . Classification of queuing models- Model I:(M/M/1):(∞ / FIFO). Simple problems.	**12**
V	**Simulation** : Introduction, definition, uses, advantages & limitations, phases of simulation, generation of random numbers, Monte - Carlo technique, applications of simulation – event type, queuing, inventory, hospital, capital budgeting models. Simple problems	**12**

Text Book:

1. KantiSwarup, P.K.Gupta , Man Mohan,Operations Research, 15th Edition, 2010, Sultan Chand & Sons, New Delhi.

2. Operations Research Theory, Methods and Applications, S.D. Sharma, HimanshuSharma, improved and enlarged edition (16th revised), 2009 KedarNath Ram Nath& Co., Meerut.

Books for Reference:

1. Kirshna's Operations Research, Dr. R. K. Gupta, 27 thEdition , 2010, Krishna Prakashan Media (P) Ltd., Meerut.
2. Operations Research: Theory and Applications, J.K.Sharma, 5th Edition, 2013, Macmillan.
3. Operations Research: An Introduction, Hamdy. A. Taha, 9th edition ,2010, Prentice Hall..

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Model Question Paper Structure for SEE

Max.: 75 Marks **COURSE CODE STAT66** **Min.Pass : 30 Marks**

Section – A

Answer any FIVE of the following **5 x 5M = 25Marks**

1. Explain the phases of simulation model(L-2,CO-5)
2. Write a short note on unbalanced assignment problem (L-1,CO-2)
3. Explain the graphical procedure of solving LPP (L-2, CO-1)
4. What are the applications of operations research(L-1,CO-1)
5. Explain in detail the North West corner rule fir finding the initial basic feasible solution (L-2,CO-2)
6. Write the differences between PERT and CPM(L-2,CO-3)
7. Explain Fulkerson's rule of numbering events of network diagram (L-2,CO-3)
8. Explain the characteristics of queuing models(L-2,CO-4)

Section – B

Answer ALL questions **5 x 10M = 50Marks**

9. a. Solve the following LPP by simplex method (L3-, CO-1)

Max. z = $9x_1 + 2x_2 + 5x_3$

subjected to $2x_1 + 3x_2 - 5x_3 \leq 12$

$$2x_1 - 2x_2 + 3x_3 \leq 3$$

$$3x_1 + x_2 - 2x_3 \leq 2$$

and $(x_1, x_2, x_3 \geq 0)$

(OR)

b. Solve the following LPP by Big M method (L-3,CO-1)

Max. z = $3x_1 - x_2$

subjected to $2x_1 + x_2 \geq 2$

$$x_1 + 3x_2 \leq 3$$

$$x_2 \leq 4$$

and $(x_1, x_2) \geq 0)$

10. a. Solve the following transportation problem to find the minimum cost(L-3,CO-2)

Source	**Destination**					**Available**
	D_1	**D2**	**D3**	**D4**	**D5**	
S_1	4	7	3	8	2	4
S_2	1	4	7	3	8	7
S_3	7	2	4	7	7	9
S_4	4	7	2	4	7	2
Required	8	3	7	2	2	

(OR)

b. Consider the problem of assigning five operators to five machines. Theassignment costs are given below:Assign the operators to different machines so that total cost is minimized.

Operators	**Machines**				
	A	**B**	**C**	**D**	**E**
I	10	3	10	7	7
II	5	9	7	11	9
III	13	18	2	9	10
IV	15	3	2	7	4
V	16	6	2	12	12

Assign the operators to different machines so that total cost is minimized.(L-3,CO-2)

11. a. A project consists of a series of tasks A,B,....H,I with the following relationships (W<X, Y means X and Y cannot start until W is completed; X,Y< W means W cannot startuntil both X and Y are completed). With this notation construct the network diagram having

the following constraints: (L-3,CO-3)

A < D, E;	B, D < F;	C < G;	B, G < H;	F, G < I

Find also the minimum time of completion of the project, when the time of completion of each task is as follows :

TASK	A	B	C	D	E	F	G	H	I
TIME	23	8	20	16	24	18	19	4	10

(OR)

b. A small project consists of seven activities, the details of which are given below

Activity	A	B	C	D	E	F	G
Most likely	3	6	3	10	7	5	4
Optimistic	1	2	3	4	3	2	4
Pesimistic	7	14	3	22	15	14	4
Preceding Activities	-	-	B	C	A, D	D	A, D
Duration	6	5	2	2	2	1	6

(i) Draw the network, number the nodes, find the critical path, the expected project completion time and the next most critical path.

(ii) What project duration will have 95% confidence of completion? (L-3,CO-3)

12. a. **A**rrivals at a telephone booth are considered to be Poisson, with an average time of 10 minutes between one arrival and the next. The lengthof a phone call assumed to be distributed exponentially with mean 3minutes. Then,(L-3,CO-4)

i) What is the probability that a person arriving at the booth will have to wait ?

ii) What is the average length of the queues that form from time totime ?

iii) The telephone department will install a second booth when convinced that an arrival would expect to have to wait at least three minutes for the phone. By how much must the flow of arrivals be increased in order to justify a second booth ?

(OR)

b. In a railway marshaling yard, goods trains arrive at a rate of 30 trains perday.Assuming that the inter - arrival time follows an exponentialdistribution and theservice time (the time taken to hump a train) distribution is also exponential with an average 36 minutes. If the yard can admit 9 trains at a time (there being 10 lines, one of which is reserved for shunting

purposes), calculate the probability that the yard is empty and find the average queue length.(L-3,CO-4)

13. a. Customers arriveat a milk booth for the required service. Assume that inter arrival times are constant and given by 15 and 4 minutes respectively. Simulate the system by hand computation for 14minutes. (i) What is the waiting time per customer (ii) What is the percentage idle time for the facility (L-3,CO-5)

(OR)

b. An automobile production line turns out about 100 cars a day, but deviations occur owing to many causes. The production is more accurately described by the probability distribution given below:

Production/day	*Probability*	*Production/day*	*Probability*
95	0.03	101	0.15
96	0.05	102	0.10
97	0.07	103	0.07
98	0.10	104	0.05
99	0.15		
100	0.20	105	0.03

Finished cars are transferred across the bay, at the end of each day, by ferry. If the ferry has space for only 101 cars, what will be the average number of cars waiting to be shipped, and what will be the average number of empty space on the boat?(L-3,CO-5)

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Data Visualization using Power BI Lab

Offered to: B. Sc. (MSDS) **Course Code**: DSCP52

Course Type: Core (Practical) **Course: Data Visualization using Power BI Lab**

Lab

Year of Introduction: 2021 **Year of offering: 2021**

Year of Revision: - **Percentage of Revision: -**

Semester: V **Credits: 1**

Hours Taught: 60 hrs. Per Semester **Max.Time**:3 Hours

Course Prerequisites (if any): Spread Sheet

Course Description: Students able to develop the dashboards

Course Objective:

The objective of this lab is to make use of model in implementing the Power BI.

Course Outcomes: At the end of this course the student is able to

1. Understand the concept Power Pivot and interface with excel analytic way. (PO5,PO6,PO7)
2. Combine data quickly from a variety of sources into your model. (PO5,PO6)
3. Prepare the data various sources, clean, merge, filter data and calculated methods. (PO5,PO6,PO7)
4. Choose the model, relationships between in the models, user friendly models. (PO5,PO7)
5. Visualize the data. (PO5,PO7)

LIST OF EXPERIMENTS

1. Excel Conditional Formatting
2. Excel IF and IFs Conditions (Sum ,Count , Average)
3. Excel Data Validation and data analysis tab
4. Creating Pivots and reports
5. Creating a Dashboard in excel
6. Installation of Power BI
7. Importing of various files in Power BI and its observations
8. Data Models and creating data models
9. Basic Powerbi Operations in (Munging Techniques)
10. Data Cleaning and cleansing techniques
11. Data Visualizations regular
12. Data Visualizations Advance

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MACHINE LEARNING

Offered to: B. Sc. (MSDS) **Course Code**: DSCT51

Course Type: Core (Theory) **Course:** MACHINE LEARNING

Year of Introduction: 2021 **Year of offering: 2021**

Year of Revision: - **Percentage of Revision:** -

Semester: V **Credits: 4**

Hours Taught: 60 hrs. Per Semester **Max.Time**: 3 Hours

Course Prerequisites (if any): Probability and Statistics, Linear Algebra

Course Description: Students Learn and build the model

Course Objective:

1. To acquire basic concepts and techniques of Machine Learning.
2. To use recent machine learning software for solving practical problems.
3. Gain hands-on experience in machine learning algorithms, the statistical models behind them and the applications of ML
4. Learn optimization formulations to minimize errors and build accurate models
5. Develop an in-depth understanding of popular methods like regression, clustering, decision trees

Course Outcomes: At the end of this course the student is able to

1. **Identify** the characteristics of machine learning. **(PO5,PO7)**
2. **Summarize** the Model building and evaluation approaches. **(PO5,PO7)**
3. **Apply** Bayesian learning and regression algorithms for real-world Problems. **(PO5, PO6, PO7).**
4. **Apply** supervised learning algorithms to solve the real-world Problems. **(CO5, PO7)**.
5. **Apply** unsupervised learning algorithms for the real world data. **(PO5, PO7).**

Syllabus		
Unit	**Learning Units**	**Lecture Hours**
I	**Introduction to Machine Learning and Preparing to Model:** **Introduction to Machine Learning-** Introduction, **What** is Human Learning? Types of Human Learning, What is Machine Learning? Types of Machine Learning, Problems Not To Be Solved Using Machine Learning, Applications of Machine Learning. **Preparing to Model-** Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing	14
II	**Modeling & Evaluation, Basics of Feature Engineering:** **Modeling & Evaluation-** Introduction, **Selecting** a Model, **Training** a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model. **Basics of Feature Engineering-** Introduction, Feature Transformation, Feature Subset Selection.	10
III	**Supervised Learning Regression** Introduction, Example of Regression, Common Regression Algorithms, Simple linear Regression, Multiple linear Regression, Assumptions in Regression Analysis, Main Problems in Regression, Analysis, Improving Accuracy of the linear Regression Model.	10
IV	**Classification** Naive Bayes model, Decision Tree, Tree Terminology, Decision Tree learning, Decision Boundaries, Random Forest, Logistic Regression.	12
V	**Unsupervised Learning** Introduction, Unsupervised Vs Supervised Learning, Applications of Unsupervised Learning, Clustering, Clustering as a machine learning task, Different types of clustering techniques, Hierarchical clustering, Finding Pattern using Association Rule, Definition of common terms, Association rule, The Apriori algorithm for association rule learning, Build the Apriori Principle Rules	12

Text Books:

	Author	Title	Publisher
1	Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das	Machine Learning,1st edition	Pearson Education India
2	Abhishek Vijavagria	Machine Learning with Python	BPB Publications

Reference Books:

	Author	Title	Publisher
1	Tom M. Mitchell	Machine Learning, 1997	MGH
2	Christopher M. Bishop	Pattern Recognition and Machine Learning, 2006	New York :Springer
3	Shai Shalev-Shwartz, ShaiBen David	Understanding Machine Learning: From Theory to Algorithms	Cambridge
4	Peter Harington	Machine Learning in Action,1st edition, 2012	Cengage
5	J. Zurada, St. Paul	Introduction to artificial neural systems	West
6	EthemAlpaydin	Introduction to machine learning,2nd ed.	The MIT Press

Course Delivery method: Face-to-face / Blended

Course has focus on: Skill Development, Employability

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MACHINE LEARNING LAB

Offered to: B. Sc. (MSDS) **Course Code**: DSCP51

Course Type: Core (Practical) **Course:** MACHINE LEARNING LAB

Year of Introduction: 2021 **Year of offering: 2021**

Year of Revision: - **Percentage of Revision:** -

Semester: V **Credits: 1**

Hours Taught: 60 hrs. Per Semester **Max. Time**: 3 Hours

Course Prerequisites (if any): Probability and Statistics, Linear Algebra

Course Description: Students learn and build the model

Course Objective:

The objective of this lab is to make use of Data sets in implementing the machine learning algorithms in any suitable language of choice.

Course Outcomes: At the end of this course the student is able to

1. Apply the appropriate pre-processing techniques on data set. (PO5,PO7)
2. Implement supervised Machine Learning algorithms. (PO5,PO7)
3. Implement unsupervised Machine Learning algorithms (PO5,PO7)

LIST OF EXPERIMENTS

1. Demonstrate the packages Numpy, Pandas, Matplotlib/Seaborn.
2. Scikit Learn Package – Loading, basics of Scikit learn.
3. How to import data, basic operations on dataframe: info, shape, head, datatypes, describe.
4. Checking missing values, Outliers, Unique value, Dropping/Adding Columns, Renaming the Columns.
5. EDA and Data Visualization
    - Numeric Variables
6. EDA and Data Visualization
    - Objective Variable
7. Scikit Learn – Splitting data, creating independent and dependent variables
8. Model Building Scikit Learn – Supervised

- Classifiaction

9. Model Building Scikit Learn – Supervised
    - Regression
10. Model Building Scikit Learn – Unsupervised
    - Clustering

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Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
V	MATT54	CORE	NUMERICAL ANALSIS &SPECIAL FUNCTIONS	100	25	75	6	5

Course Outcomes of MATT54

S. No	C.O Upon successful completion of this course, students should have the knowledge and skills to:	
1	Define the Basic concepts of operators Δ, ∇, E and solve problems using Newton's forward and Newton's backward formulas.	
2	Apply various interpolation methods and divided difference concepts to solve problems.	
3	Define the Basic concepts of operators μ, δ and solve problems using central difference formulas.	
4	Solve improper integrals using Beta and Gamma functions.	
5	Define the basic concepts of $J_n(x)$, Recurrence relations and solve problems using recurrence relations.	

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1							**M**
CO2					**M**		
CO3						**M**	
CO4							**L**
CO5					**M**		

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE:VIJAYAWADA-10

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	MAT T54	2021 – 22 onwards	B.Sc (MSDS)

NUMERICAL ANALYSIS & SPECIAL FUNCTIONS

SEMESTER-V **No of Credits: 5**

OBJECTIVES: 1. TO ENHANCE THE COMPUTATIONAL SKILLS AND APPLICATION SKILLS.

UNIT I : FINITE DIFFERENCES (15 hrs)

1.1 Operators Δ, ∇ and E-problems related.
1.2 Fundamental theorem of finite differences.
1.3 Missing terms problems.
1.4 Newton's Gregory Forward interpolation formula derivation and problems related.
1.5 Newton Gregory backward interpolation formula derivation and problems related.

UNIT II: DIVIDED DIFFERENCES (15 hrs)

2.1 Divided differences definition and properties problems related.
2.2 Newton's divided difference formula derivation and problems related.
2.3 Lagrange's interpolation formula derivation and problems related.
2.4 Relation between divided differences and forward, backward differences.
2.5 Lagrange's Inverse interpolation formula derivation and problems related.

UNIT III: CENTRAL DIFFERENCES (15 hrs)

3.1 Central difference operators related problems
3.2 The Gauss Forward and Gauss Backward formula derivations and problems related.
3.3 Stirling's formula derivation and problems related.
3.4 Bessel's formula problems only.
3.5 Everett's formula problems only.

UNIT IV: BETA AND GAMMA FUNCTIONS (15 hrs)

4.1 Gamma function definition properties and problems related.
4.2 Beta function definition properties.
4.3 Relation between Beta and Gamma functions problems related.
4.4 Other forms of Beta integral problems related.
4.5 Legendre's duplication formula.

UNIT V: BESSEL'S EQUATIONS (15 hrs)

5.1 Bessel's differential equation and definition.
5.2 Recurrence relations and related problems.
5.3 Generating function of Bessel's equation.
5.4 Problems on Bessel's differential equations.

Prescribed Text book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – III	Deepthi Publications	2015
2	J.N Sharma and R.K Gupta	Special Functions	Krishna Prakashan Media (P) Ltd., Meerut.	2005

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	G.Shankar Rao	Numerical analysis	Pragati Prakashan.	2010
2	Dr. D. Chitti Babu	Numerical analysis	Pragati Prakshan.	2012

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SEMESTER – V
Model Paper

COURSE CODE: MAT T54

TITLE OF THE PAPER: NUMERICAL ANALYSIS & SPECIAL FUNCTIONS

Time: 3hrs. **Max. Marks: 75**

Section – A

Answer any FIVE questions **5x5=25**

1. Prove that $\Delta \log f(x) = \log\left[1+\frac{\Delta f(x)}{f(x)}\right]$ (CO1,L2)
2. Find missing term in the following data.

X:	0	1	2	3	4
Y:	1	3	9	-	81

(CO1,L2)

3. Find the third divided difference of the function $f(x) = x^3 + x + 2$ for the arguments 1, 3, 6, 11. (C02,L2)
4. Prove that $\delta^3 y_{1/2} = y_2 - 3y_1 + 3y_0 - y_{-1}$ (C03,L2)
5. State Lagrange's Interpolation formula. (C02,L2)
6. Prove that $\Gamma(1/2) = \sqrt{\pi}$ (C04,L4)
7. Evaluate $\int_0^1 x^4(1-x)^2\,dx$ (C04,L4)
8. Prove that $J_0^{\,1} = -J_1$ (C05,L4)

Section – B

Answer ALL questions. **(5 x 10 = 50)**

Unit - I

9. (a) State and prove the fundamental theorem of difference calculus. (CO1,L2)

(OR)

(b) State and prove Newton's – Gregory forward formula for interpolation. (CO1,L2)

Unit – II

10. (a) Using Newton's Divided difference formula to find f(9) from the data. (CO2,L2)

x	5	7	11	13	17
y	150	392	1452	2366	5202

(OR)

(b) Using the Lagrange's formula, find f(2) from the given data (C02,L2)

x	0	1	3	4
f(x)	5	6	50	105

Unit – III

11. (a) State and Prove Gauss forward interpolation formula. (C03,L2)

(OR)

(b) Apply Sterling's formula to find a polynomial of degree 4 which takes. (C03,L2)

x	1	2	3	4	5
y	1	-1	1	-1	1

Unit – IV

12 (a) Prove that $\beta(l, m) = \frac{\Gamma(l)\Gamma(m)}{\Gamma(l+m)}$. (C04,L4)

(OR)

(b) State and prove Legendre's Duplication formula. (C04,L4)

Unit - V

13 (a) State and prove Generating function for $J_n(x)$. (C05,L4)

(OR)

(b) Prove that $2J_n'(x) = J_{n-1}(x) - J_{n+1}(x)$. (C05,L4)

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Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
V	MATT55	CORE	REAL ANALYSIS	100	25	75	6	5

Course Outcomes of MATT55

S. No	C.O
	Upon successful completion of this course, students should have the knowledge and skills to:
1	Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate the limit of a bounded sequence.
2	Apply the Ratio, Root, Alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
3	Calculate the limit and examine the continuity of a function at a point.
4	Understand the consequences of various mean value theorems for differentiable functions.
5	Determine the Riemann integrability and the Riemann-Stieltjes integrability of a bounded function and prove a selection of theorems concerning integration.

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1					**M**		
CO2					**H**		
CO3							**M**
CO4						**M**	
CO5							**M**

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE:: VIJAYAWADA-10.

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	**MAT T55**	**2021-2022 onwards**	**B.Sc.(MSDS)**

REAL ANALYSIS

SEMESTER-V **No of Credits: 5**

LOGICAL THINKINGNESS OF THE STUDENT.

UNIT-I: SEQUENCES (15 Hrs)

1.1 Sequences, Range of sequences, Subsequences, Bounded sequences

1.2 Limit of a sequences, convergent sequences, Divergent and oscillatory sequences.

1.3 sandwich Theorem and related problems.

1.4 monotonic sequences – theorems – related problems.

1.5 Bolzano Weistrass theorem – related problems.

1.6 Cauchy sequences, Cauchy general principle of convergence – Related problems.

1.7 Cauchy's first theorem of limits, Corollary of Cauchy's first theorem on limits, related problems, Cauchy's second theorem on limits and related problems.

UNIT-II: INFINITE SERIES (15 Hrs)

2.1 Introduction to Infinite Series, behaviour of the series, Cauchy's general principle of convergence for series,

2.2 series of non-negative terms, Geometric series, Auxiliary series

2.3 Comparison test of first type, second type, Limit Comparison test – Related Problems.

2.4 Cauchy's nth root test – Related problems.

2.5 D'Alembert's ratio test and their problems,

2.6 Alternating series, Leibnitz's test and Problems.

2.7 Absolute convergent series, conditionally convergent series.

UNIT-III: LIMITS AND CONTINUITY (15 Hrs)

3.1 Limit of a function, algebra of limits

3.2 Sandwich theorem, limits at infinity – Problems.

3.3 continuity of a function at a point and on an interval, Algebra of continuous functions,

3.4 Standard theorems on Continuous functions.

3.5 Uniform Continuity definition – theorems – problems.

UNIT-IV: DIFFERENTIATION (15 Hrs)

4.1 Derivative of a function on an interval at a point, Algebra of derivative functions

4.2 Increasing and decreasing functions definition and problems

4.3 Darboux's theorem, Rolle'sTheorem, Lagrange's mean value theorem, Cauchy's mean value theorem and their problems,

UNIT-V: RIEMANN INTEGRATION (15Hrs)

5.1 Introduction, partitions, lower and upper Riemann sums – Properties and problems.

5.5 Lower and Upper Riemann Integrals, Darboux's theorem, Riemann Integrability

5.7 Necessary and sufficient condition for R-Integrability and problems

5.8 Algebra of integrable functions.

5.10 Fundamental theorem of integral calculus and problems.

5.11 Integral as the limit of a sum and problems.

5.12 Mean value theorems of integral calculus.

Prescribed Text books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	BVSS Sharma, S. AnjaneyaSastry& N. Krishna Murthy	A text book of mathematics for B.A/B.ScVol – II	S-Chand Company Ltd.	2014

Reference books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	2015
2	V.Venkateswararao N.Krishna Murthy B.V.S.S. Sharma S. Rangnatham	A text book of B.Sc mathematics	S-Chand	2015

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE:: VIJAYAWADA-10.

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

SEMESTER – V

Model Paper

COURSE CODE : MAT T54

TITLE OF THE PAPER : REAL ANALYSIS

Time: 3hrs. **Max. Marks: 75**

Section – A

Answer any FIVE questions **(5x5=25 marks)**

1. Prove that every convergent sequence is bounded. (CO1,L2)
2. Prove that a convergence sequence has a unique limit. (CO1,L2)
3. Test for convergence of $\sum_{n=1}^{\infty}\frac{\sqrt{n}}{n^2+1}$. (CO2,L3)
4. Examine for continuity the function $f(x)=|x|+|x-1|$ at $x=1$ (CO3,L2)
5. If $f(x)=\frac{e^{1/x}}{1+e^{1/x}}$ find whether $\underset{x\to 0}{Lt}\, f(x)$ exists or not. (CO3,L2)
6. Find 'C' of Cauchy's mean value theorem $f(x)=\frac{1}{x^2}, g(x)=\frac{1}{x}$ on $[a,b] a,b>0$ (CO4,L3)
7. Prove that $f(x)=\frac{x}{\sin x}$ is increasing in $\left[0,\frac{\pi}{2}\right]$ (CO4,L3)
8. Prove that $f(x)=x[x]$ is integrable on $[0,2]$ and find $\int_0^2 x[x]dx$ (CO5,L3)

Section – B

Answer ALL questions. **(5 x 10 = 50 marks)**

Unit – I

9(a).If $S_n=\frac{1}{n+1}+\frac{1}{n+2}+.....+\frac{1}{n+n}$ then show that $\{S_n\}$ is convergent. (CO1,L2)

(OR)

9(b).State and Prove Cauchy's general principle of convergence for sequences. (CO1,L2)

Unit – II

10(a).State and Prove D'Alembert's ratio test. (CO2,L3)

(OR)

10(b).Show that the Series $\sum_{n=1}^{\infty}(-1)^n\left(\sqrt{n^2+1}-n\right)$ is conditionally convergent. (CO2,L3)

Unit - III

11(a). Prove that if $f : S \to R$ is uniformly continuous then f is continuous in S. Is the converse true? Justify your answer. (CO3,L2)

(OR)

11(b).If $f : [a,b] \to R$ is continuous on $[a,b]$, then prove that f is bounded on $[a,b]$ and attains its bounds. (CO3,L2)

Unit - IV

12(a).State and prove Rolle's theorem. (CO4,L3)

(OR)

12(b).Using Lagrange's theorem show that $x > \log(1+x) > \frac{x}{1+x}$. (CO4,L3)

Unit - V

13(a).Show that $f(x) = 3x+1$ is integrable on $[1,2]$ and $\int_1^2 (3x+1)dx = \frac{11}{2}$ (CO5,L3)

(OR)

13(b).Prove that every continuous function in [a,b] is Riemann Integrable. (CO5,L3)

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous -ISO 9001 – 2015 Certified

WITH EFFECT FROM 2019-20

Designs of Sample Surveys

Offered to: BA(EMS) & B.SC (MSCs, MSDS) / STAP51
Course Type: Core (Practical)
Year of Introduction: **Year of Revision: 2021** **Percentage of Revision: Nil**
Semester: V **Credits: 1**
No. Hours Taught: 30 hrs. per Semester **Max.Time:** 2 Hours

Title of the course : **Designs of Sample Surveys**		
Course Outcome	**Course: STAP51** Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	Construct random sample using normal distribution.	
CO 2	Analyze the simple random sampling under with and without replacement	
CO3	Analyze Methods the systematic sampling methods.	
CO 4	compare the various of simple random sampling, Stratified and systematic random sampling	
CO 5	compare the efficiencies of SRS, STRS & SYS sampling Methods	

CO-PO MATRIX							
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
STAP51	**CO1**						
	CO2						
	CO3						
	CO4						
	CO5						

1. Construction of random sample using Normal Distribution

2. Construction of SRS when population units are specified under WR & WOR
   Verification of sample mean is an unbiased estimate of the population mean

3. Comparison of efficiency of SRSWR & SRSWOR

4. Determination of sample sizes from strata using
   (i) Proportional allocation (ii) Optimum allocation

5. Computation of variance of estimate of the population mean in stratified random sampling (STRS)

6. Comparison of efficiencies of proportional and optimum allocations with SRSWOR

7. Construction of systematic sample

8. Comparison of precision of systematic sampling, simple random sampling and stratified sampling

P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous -ISO 9001 – 2015 Certified

Multivariate Data AnalysisUsing 'R'

Offered to: B.SC (MSDS) / STAP57
Course Type: Core (Practical)
Year of Introduction: 2021 **Percentage of Revision: Nil**
Semester: V Paper No. V **Credits: 1**
Hours Taught: 30periods. per Semester **Max.Time: 2** Hours

Title of the course : **Multivariate Data AnalysisUsing 'R'**		
Course Outcome	**Course: STAP57** Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	Understand the applications of hotelling T^2 and D^2 test for one and two samples	PO5
CO 2	Build simple and multiple linear regression models with categorical explanatory variable	PO6
CO3	Determine and testing for overall model fit and individual regression coefficients using R-square and adjusted R – square methods	PO6
CO 4	Studying the interaction effects among explanatory variable	PO6
CO 5	Analyze the hierarchical and k-means methods	PO5

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAP57	**CO1**					**H**		
	CO2						**H**	
	CO3						**H**	
	CO4						**H**	
	CO5					**M**		

List of practical's

1. Hotelling's T^2 Test (One sample problem)
2. Hotelling's T^2 Test (Two sample problem)
3. D^2 test for two samples

Using 'R'

4. Building Simple Linear Regression Model to the given data.
5. Building Multiple Linear Regression Model with Categorical Explanatory Variable.
6. Testing for Overall Model fit and Individual Regression Coefficients.
7. Determining R-Square, Adjusted R-Square, MAE and MAPE.
8. Study of Interaction Effects among Explanatory variable
9. Cluster Analysis – Hierarchical method with different linkages
10. Cluster Analysis – K-Means method.

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

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Designs of Sample Surveys

Offered to: BA(EMS) & B.SC (MSCs, MSDS) / STAT51 **Course Type:** Core (Theory)
Year of Introduction: **Year of Revision: 2021** **Percentage of Revision: Nil**
Semester: V **Paper No. V** **Credits: 4**
No. Hours Taught: 60 Periods. per Semester **Max. Time:** 3 Hours

Title of the course: **Designs of Sample Surveys**		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	Develop the basic knowledge in Survey and sampling methods.	PO –5
CO 2	Knowing the concept of non-probability sampling methods and their applications.	PO –5
CO3	Knowledge of various types of simple random sampling(SRS), their organization and evaluation of summary measures such as Mean, variance and proportion.	PO –6
CO 4	know about the concept of stratified random sampling(STRS), comparisons and efficiencies of stratified random sampling(STRS) over simple random sampling(SRS)	PO –5
CO 5	Get the knowledge in respect of drawing a Systematic random sampling(SYRS) and presence of linear trend of Systematic random sampling (SYRS)vssimple random sampling (SRS) and Systematic random sampling (SYRS)vsstratified random sampling (STRS).	PO –6

CO-PO MATRIX							
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
STAT51	**CO1**						
	CO2						
	CO3						
	CO4						
	CO5						

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	Concepts of Population and Sample, Basic principles of sample survey, The principles steps in a sample survey, Complete enumeration vs Sampling, Sampling and non-sampling errors, Limitations of sampling, Types of sampling - Non Probability sampling methods, Probability sampling methods.	**12**
II	Non Random Sampling Methods, Purposive sampling, Quota sampling, Sequential sampling, Cluster sampling.	**12**
III	Simple Random sampling - SRSWR definition and procedure of selecting a sample, SRSWOR definition and procedure of selecting a sample. Estimates of population – Mean, variance. Variance of - simple mean and simple variance. Advantages and disadvantages	**12**
IV	Stratified Random Sampling - Construction procedure, Estimates of mean and variance, Advantages. Allocation of sample size and estimates of mean and variance – Proportional, Optimum (Neymann). Comparison of Stratified Random Sampling (STRS) with Simple Random Sampling (SRS), Efficiency of Stratified Random Sampling (STRS) over Simple Random Sampling (SRS) and Determination of number of strata	**12**
V	Systematic sampling - Construction procedure, Estimates of mean and variance, Advantages and disadvantages. Types - Linear (N = n x k), Circular. In the presence of linear trend, Systematic Random sampling (SYRS) vs - Simple Random sampling (SRS) and Stratified Random Sampling (STRS).	**12**

Text Book

1. S.C. Gupta & V.K. Kapoor. Fundamentals of Applied Statistics,4th Edition, 2007, Sultan Chand & Sons.

Unit : I	7.3 to 7.7
Unit : II	7.8.1, 7.14
Unit : III	7.9.2,7.9.4,7.9.5,7.9.5
Unit : IV	7.10.1 to 7.10.4,7.10.7,7.10.9
Unit : V	7.11.1 to 7.11.5

Reference Text Books

1. B.A/B.Sc. Third Year by Telugu Akademi
2. W.G. Cochran. Sampling Techniques, 3rd edition, John wiley& Sons Pvt. Ltd. 1977
3. P. Mukhopadhyay. Applied Statistics, Books& Allied pvt.Ltd., 2011
4. D.Singh&Chowdhary. Theory and Analysis of Sample Survey Designs, John wiley& Sons Pvt. Ltd, 2014

Websites of Interest: **http://onlinestatbook.com/rvls/index.html**

Co-Curricular Activities in the class:

1. Pictionary
2. Case Studies on topics in field of statistics
3. Snap test and Open Book test
4. Architectural – To be build the procedures
5. Extempore – Random concept to students
6. Interactive Sessions
7. Teaching through real world examples

Model Question Paper Structure for SEE

Max.: 75 Marks **Min. Pass: 30 Marks**

Designs of Sample Surveys

Section – A

Answer any FIVE of the following **5 x 5M = 25Marks**

1. Briefly explain Quota sampling. (Co – 2, L – 2)
2. Explain Sampling Errors. (Co – 1, L – 2)
3. Limitations of sampling. (Co – 1, L – 2)
4. Write the advantages of simple random sampling. (Co – 3, L – 2)
5. Explain the construction of stratified random sampling. (Co – 4, L – 1)
6. Explain the advantages of systematic sampling. (Co – 5, L – 1)
7. Explain proportional allocation. (Co – 4, L – 1)
8. Explain the construction of simple random sampling. (Co – 3, L – 1)

Section – B

Answer ALL questions **5 x 10M = 50Marks**

9. a. Explain basic principles of sampling. (Co – 1, L – 2)

(OR)

b. Explain the principles steps in a sample survey. (Co – 1, L – 2)

10. a. Explain purposive sampling. (Co – 2, L – 2)

(OR)

b. Explain Sequential sampling. (Co – 2, L – 2)

11. a. In SRSWOR, the sample mean square is an unbiased estimate of the population mean square. (Co – 3, L – 1)

(OR)

b. Draw all possible samples of size 2 from the population {5,7,6} under SRSWR. Verify that sample mean is an unbiased estimate of the population mean. (Co – 3, L – 3)

12. a. Show that $V(\overline{y_{st}})_{Ney} \leq V(\overline{y_{st}})_P \leq V(\overline{y_n})_R$. (Co – 4, L – 1)

(OR)

b. A sample of 30 students is to be drawn from a population consisting of 300students belonging to two colleges A & B. The means and SD's of their marks are given below

	Stratum size N_i	Means	SD's

A	200	30	10
B	100	60	40

How would you draw the sample using proportional allocation technique. Also calculate $V(\overline{y_{st}})_P$. (Co – 4, L – 3)

13. a. If the population consists of a linear trend then Show that (Co – 5, L – 1)

$$V(\overline{y_{st}}) \leq V(\overline{y_{sys}}) \leq V(\overline{y_n})_R$$

(OR)

b. For a small artificial population which exhibits a fairly steady rising trend. Each column
represents a systematic sample and the rows are the strata. Find the variance of the systematic sample mean. Given that n=3, k=10, N=30. (Co – 5, L – 3)

Strata	Systematic sample number									
	1	2	3	4	5	6	7	8	9	10
I	0	1	1	2	5	4	7	7	8	6
II	6	8	9	10	13	12	15	16	16	17
III	18	19	20	20	24	23	25	28	29	27

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous -ISO 9001 – 2015 Certified

Multivariate Data Analysis

Offered to: B.Sc (MSDS) / STAT57 **Course Type:** Core (Theory)
Year of Introduction: 2021 **Percentage of Revision: Nil**
Semester: V **Paper No. V** **Credits: 4**
Hours Taught: 60periods. per Semester **Max.Time: 3** Hours

Title of the course : **Multivariate Data Analysis**		
Course Outcome	**Course:** Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	To apply the regression model for estimating the R^2 and mean absolute error.	
CO 2	Define the concepts of multivariate analysis, and classification of multivariate analysis techniques, estimation of variance and covariance matrix.	
CO3	Explain The Generalized T^2 Statistic (HOTTELING T^2)– Distribution & Applications and Mahalanobi's D^2Statistic.	
CO 4	Classify the discrimination between two multivariate normal poplutaions and fishers discrimination two separation of population.	
CO 5	Explain the Cluster Analysis : Hierarchical Clustering Methods – Single linkage, complete linkage and average linkage, and Ward's method. Non-Hierarchical Methods – K Means. Multidimensional scaling.	

CO-PO MATRIX							
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
STAT57	**CO1**						
	CO2						
	CO3						
	CO4						
	CO5						

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	Introduction to Multiple Linear Regression Model, Partial Regression Coefficients, Testing for Individual Regression Coefficients, Testing Significance of Overall fit of the model, Estimating R^2, mean absolute error and mean absolute percentage error.	**12**
II	Introduction to Multivariate Analysis - Meaning of Multivariate Analysis, classification of multivariate techniques (Dependence Techniques and Inter-dependence Techniques), Applications of Multivariate Techniques in different disciplines.Multivariate normal distribution: Estimation of Mean and Var-Cov matrix.	**12**
III	The Generalized T^2 Statistic (HOTTELING T^2)– Distribution & Applications. Mahalanobi's D^2Statistic.Wilk's - criterion and statement of its their properties with simple applications.	**12**
IV	Discriminant Analysis: Classification and discriminant procedures for discrimination between two multivariate normal populations, Fisher's discrimination function – separation of two populations. Classification with several multivariate normal populations.	**12**
V	Cluster Analysis : Hierarchical Clustering Methods – Single linkage, complete linkage and average linkage, and Ward's method. Non-Hierarchical Methods – K Means. Multidimensional scaling.	**12**

Text Book:

1. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, 11/e (2010), Sultan Chand & Sons
2. Johnson, Richard A and. Wichern D.W (2007): Applied Multivariate Statistical Analysis, 6 /e, Pearson edition

Books for Reference:

1. Anderson T. W: An Introduction to Multivariate Statistical Analysis, 3/e, , WileyInterscience
2. Alvin C. Rencher (2003): Methods of Multivariate Analysis, 2/e, Wiley Interscience
3. Affifi, Abdelmonem., May, Susanne. and A. Clark., Virginia. (2012) Practical Multivariate Analysis 5 / e, CRC Press, Taylor & Francis Group.

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Model Question Paper Structure for SEE

Max.: 75 Marks **Min.Pass : 30 Marks**

Multivariate Data Analysis

Section – A

Answer any FIVE of the following **5 x 5M = 25Marks**

1. Briefly explain mean absolute error (L-2, CO-1)
2. Write a short note on partial regression coefficients (L-1, CO – 1)
3. Explain the properties of multivariate normal distribution ((L-2, CO- 2)
4. What are the applications of multivariate data analysis(L-1, CO-2)
5. Explain the Fisher's method for discriminating the populations (L-2, CO-3)
6. Explain the single linkage method in cluster analysis(L-2, CO-5)
7. Explain Wilik's criteria (L-2, CO-4)
8. Explain the classification procedures of multivariatesamples (L-2, CO-2)

Section – B

Answer ALL questions **5 x 10M = 50Marks**

9. a. Explain R^2 and adjusted R^2 (L-2, CO-1)

(OR)

b. Construct the multiple regression equation of $y = \beta_0 + \beta_1 X_1 + \beta_2 X_2$ from the following data (L-3, CO-1)

y	2	3	4	6	7	8
X_1	2	7	8	9	6	4
X_2	7	9	5	6	4	8

10. a. Explain the difference between classification problem into two classes and testing problem? (L-2, CO-3)

(OR)

b. Consider the two data sets from populations Π1 andΠ2 respectively,

$X_1 = \begin{pmatrix} 3 & 7 \\ 2 & 4 \\ 4 & 7 \end{pmatrix}$ and $X_2 = \begin{pmatrix} 6 & 9 \\ 5 & 7 \\ 4 & 8 \end{pmatrix}$ and $S_{pooled} = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$ Calculate the linear discriminant function (L-3, CO-3)

11. a. Obtain the maximum likelihood estimator Σ of p-variate normal distribution.

(L-3,CO-2)

(OR)

b. Derive the m.g.f of multivariate normal distribution (L-3, CO-2)

12. a. Deriving T^2 -statistic as the Likelihood Ratio Test of $H_0 : \mu = \mu_0$ (L-3, CO-4)

(OR)

b. T^2 - statistic is invariant (unchanged) under changes in the units of measurements for X of the form, $Y = CX + d$, where C is non-singular (L-3, CO-4)

13. a. Explain different cluster linkage methods (L-2, CO-5)

(OR)

b. Explain k – means method in clustering(L-2, CO-5)

P. B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE: VIJAYAWADA-10.
(An Autonomous college in the jurisdiction of Krishna University, Machilipatnam)

Computer Science	DSCP41	2020-21	B.Sc. (MSDS)

SEMESTER: IV **No of Credits:2**

DATABASE MANAGEMENTSYSTEMS LAB

Pre-requisites: Elementary set theory, concepts of relations and functions.

Course Objective: The major objective of this lab is to provide a strong formal foundation in database concepts, technology and practice to the participants to groom them into well-informed database application developers.

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

COs	Statements	Bloom's Level
CO1	Design & implement a database schema for a given problem-domain	**L3**
CO2	Create database using SQL and implement various integrity constraints	**L4**
CO3	Apply PL/SQL Programming for problem solving	**L4**

Course Articulation Matrix (CO-PO Mapping)

	Pos							PSOs		
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3	1	3	-	-	1	3	-
CO2	2	2	2	1	3	-	-	1	3	-
CO3	2	2	2	1	3	-	-	3	3	-

CYCLE-1

Week - 1&2:

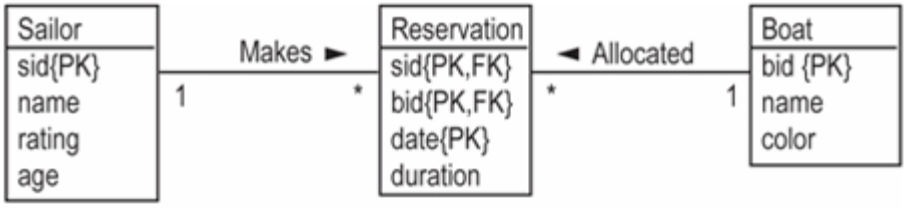
1) Create a table **STUDENT** with appropriate data types and perform the following queries. Attributes are Roll number, student name, and date of birth, branch and year of study.

a) Insert 5 to 10 rows in a table?
b) List all the students of all branches
c) List student names whose name starts with 's'
d) List student names whose name contains 's' as third literal
e) List student names whose contains two 's' anywhere in the name
f) List students whose branch is NULL

g) List students of CSE & ECE who born after 1980
h) List all students in reverse order of their names
i) Delete students of any branch whose name starts with ‘s’
j) Update the branch of CSE students to ECE
k) Display student name padded with ‘*’ after the name of all the students

Week - 3:

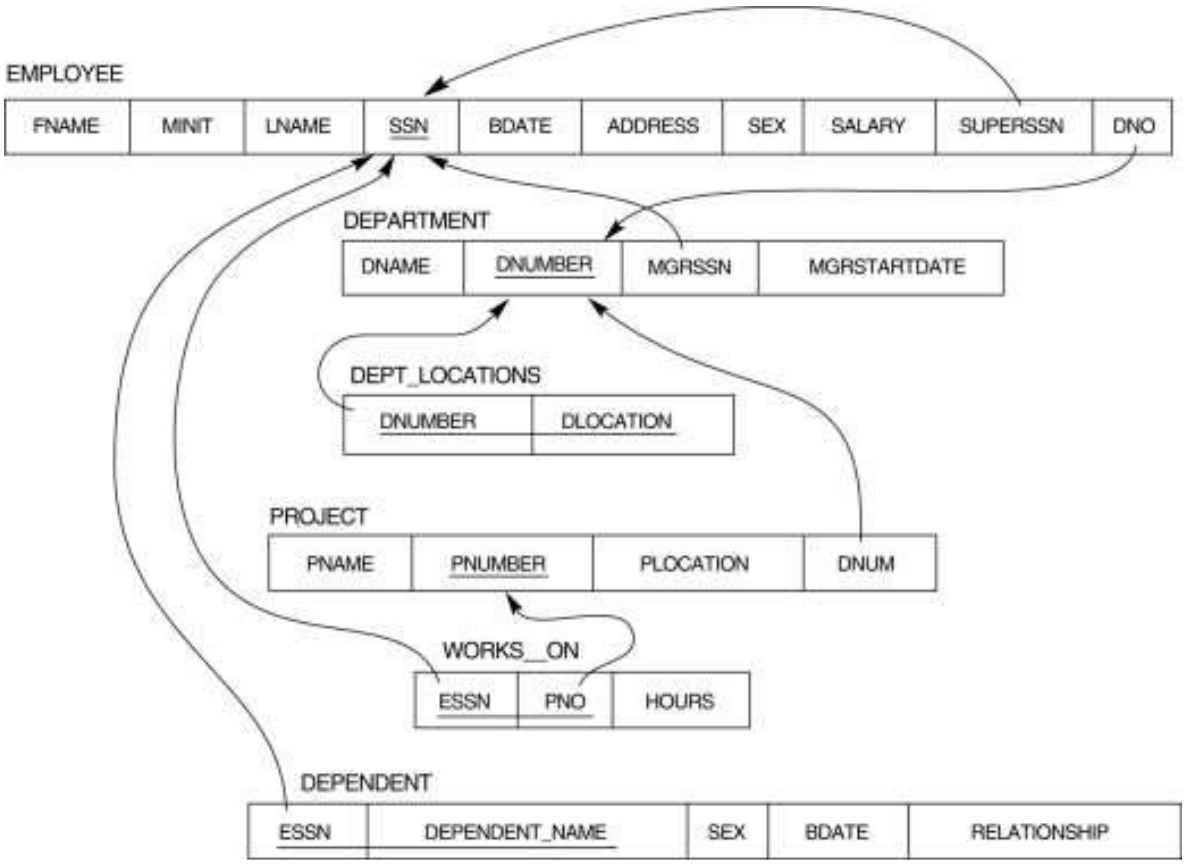
2) Create the following tables based on the given Schema Diagram with appropriate data types and constraints and perform the following queries.



SAILORS (Saild, Salname, Rating, Age)
RESERVES (Sailid, boatid, Day)
BOATS (Boatid, Boat-name, Color)

a) Insert 5 to 10 rows in all tables?
b) Find the name of sailors who reserved boat number 3.
c) Find the name of sailors who reserved green boat.
d) Find the colours of boats reserved by “Ramesh”.
e) Find the names of sailors who have reserved atleast one boat.
f) Find the all sailid of sailors who have a rating of 10 or have reserved boat 104.
g) Find the Sailid’s of sailors with age over 20 who have not registered a red boat.
h) Find the names of sailors who have reserved a red or green boat.
i) Find sailors whose rating is better than some sailor called ‘Salvador’.
j) Find the names of sailors who are older than the oldest sailor with a rating of 10.

Week – 4 & 5:
3) Schema Diagram for the rest of the SQL and PLSQL Programs.



Create the following tables based on the above Schema Diagram with appropriate data typesand constraints.

EMPLOYEE(Fname, Mname, Lname, SSN, Bdate, Address, Gender, Salary, SuperSSN, Dno)
DEPARTMENT (Dnumber, Dname, MgrSSN, Mgrstartdate)
DEPENDENT (ESSN, Dependent_Name, Gender, Bdate, Relationship)

a) Insert 5 to 10 rows into all the tables.
b) Display all employees ‘names along with their department names.
c) Display all employees ‘names along with their dependent details.
d) Display name and address of all employees who work for ‘ECE’ department.
e) List the names of all employees with two or more dependents.
f) List the names of employee who have no dependents.
g) List the names of employees who have at least one dependent.
h) List the names of the employees along with names of their supervisors using aliases.
i) Display name of the department and name of manager for all the departments.
j) Display the name of each employee who has a dependent with the same first name and gender as the employee.
k) List the names of managers who have at least one dependent.
l) Display the sum of all employee’s salaries as well as maximum, minimum and average salary in the entire departments department wise if the department has more than two employees.
m) List the departments of each female employee along with her name.

n) List all employee names and also the name of the department they manage if they happen to manage a dept.

o) Display the name of the employee and his / her supervisor ‘s name.

DEPT_LOCATIONS (Dnumber, Dloaction)

PROJECT (Pname, Pnumber, Plocation, Dnum)

WORKS_ON (ESSN, Pno, Hours)

a) Insert 5 to 10 rows into all the tables.

b) Find the names of the employees who work on all the projects controlled by the department ‘ECM’.

c) List the project number, name and no. Of employees who work on that project for all the projects.

d) List the names of all the projects controlled by the departments department wise.

e) Retrieve the names of employees who work on all projects that ‘John’ works on.

f) List the project numbers for projects that involve an employee either as worker or as a manager of the department that controls the project.

g) List the names of all employees in one department who work more than 10 hours on one specific project.

h) For each project, list the project name and total hours (by all employees) spent on that project.

i) Retrieve the names of all employees who work on every project.

j) Retrieve the names of all employees who do not work on any project.

k) Display the name and total no. of hours worked by an employee who is working on maximum no. of projects among all the employees.

l) Display the names of all employees and also no. of hours, project names that they work on if they happen to work on any project (use outer join).

m) List the employee’s name, project name on which they work and the department they belong to for all the employees using alias names for the resulting columns.

n) Retrieve the names of all employees who work on more than one project department wise.

o) List all the departments that contain at least one occurrence of ‘C‘in their names.

Week - 6:

5) Create a view that has project name, controlling department name, number of employees and total hours worked on the project for each project with more than one employee working on it.

a) List the projects that are controlled by one department from this view.

b) List the managers of the controlling departments for all the projects.

c) Demonstrate one update operation on this view.

d) List the Location of the controlling departments for all the projects.

e) Retrieve the data from the view.

PYTHON MYSQL LAB CYCLE

CYCLE-II

Week - 7:

1. How to connect MySQL database in Python
    - Arguments required to connect

Week - 8:

2. Create MySQL table from Python

Week – 9,10&11:

3. Python MySQL CRUD Operation

Week - 12:

4. Python MySQL Connection arguments list
    - Use the Dictionary to keep MySQL Connection arguments

Week – 13,14,& 15:

5. Implementation cycle-I experiments using python mysql connect

Web Links:

- https://nptel.ac.in/courses/106/105/106105175/
- https://www.javatpoint.com/dbms-tutorial
- https://www.tutorialspoint.com/dbms/index.htm
- https://www.studytonight.com/dbms/
- https://www.geeksforgeeks.org/dbms/
- https://www.w3schools.in/dbms/
- https://pynative.com/python-mysql-database-connection/

P. B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE: VIJAYAWADA-10.
(An Autonomous college in the jurisdiction of Krishna University, Machilipatnam)

Computer Science	DSCT41	2020-21	B.Sc. (MSDS)

SEMESTER: IV **No of Credits: 3** **Teaching Hrs. 60**

DATABASE MANAGEMENTSYSTEMS

Course objectives:

In this course student will learn about

- Various Data Models, Schemas, Instances, Three Schema Architecture and DBMS Components.
- Data modeling using the entity-relationship and practice developing database designs.
- Solving problems by constructing database queries using the Structured Query Language (SQL) and PL/SQL.
- Applying normalization techniques to normalize the database.
- The need of database processing and learn techniques for controlling the consequences of concurrent data access, Indexing Techniques for physical implementation of databases.

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

COs	Statements	Bloom's Level
CO1	Understand the components of DBMS & design database using ER model	**L2**
CO2	Construct database using SQL and extract data from database using Relational algebra &SQL queries	**L3**
CO3	Apply the normalization process for effective database design	**L4**
CO4	Analyse components of transaction processing, Concurrency control mechanisms and recovery strategies of DBMS	**L3**
CO5	Evaluate different File organization & Indexing Techniques	**L2**

Course Articulation Matrix (CO-PO Mapping)

	POs							PSOs		
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	3	1	-	1	-	3	2	-
CO2	2	3	2	1	-	1	-	3	2	-
CO3	2	3	2	2	-	1	-	3	2	-
CO4	2	3	2	1	-	1	-	3	2	-
CO5	2	2	2	1	-	1	-	3	2	-

UNIT No	Syllabus Content	No. of Periods
1	**Introduction to Database Management Systems:** Database system Applications, Database system Vs. File system, Data Abstraction, Instances and Schemas, Database users, Database system structure, Database design and ER diagrams, ER Design - Entities, Attributes, Entity sets, Relationships and Relationship sets, Additional Features of ER model.	12
2	**Introduction to Relational model:** Integrity constraints over the relations, Enforcing integrity constraints, Database Languages, DDL, DML, TCL, basic form of SQL query, Querying relational data, Logical database Design views, Destroying and altering tables/views. Nested queries correlated nested queries, Null values, Relation Algebra- selection, projection, renaming, join, examples.	12
3	**Normalization:** Schema refinement — Problems caused by redundancy, Decompositions — Problem related to decomposition — reasoning about FDS, FIRST, SECOND, THIRD Normal forms —BCNF — Lossless-join Decomposition, Dependency- preserving Decomposition — Schema Refinement in Data base Design — Multi valued Dependencies — Fourth Normal Form and Fifth Normal form.	12
4	**Transaction Management and Concurrence Control:** ACID properties, Transactions and Schedules, Concurrent Execution of transactions, Serializability and Recoverability. **Introduction to Lock Management:** Lock Conversions, Dealing with Dead Locks, Concurrency without Locking. Performance Locking, Transaction Support in SQL, Crash Recovery -Aries algorithm.	12
5	**File organizations:** Comparison of File Organizations, Index data Structures, Tree based Indexing-Indexed Sequential Access Methods (ISAM), B-tree, B+ Trees: Dynamic Index Structure. **Hash Based Indexing:** Static Hashing — Linear Hashing, Extendable hashing.	12

TEXT BOOK:

RaghuramaKrishnan and Johannes Gehrke, “Data Base Management Systems”, TMH 3’[d]Edition, 2003.

REFERENCES:

1. Silberschatz, Korth, “Data Base System Concepts”, 5/e,TMH,2006.
2. ElinasriNavathe, “Data Base Management System”, 7/e, ,Pearson,2017.
3. C.I.Date, “Introduction to Data Base Systems”. 8/e, ,Pearson,2008.
4. Majuindr, Bhattacharyya,” Data Base Management Systems”, TMH,96.
5. Peter ROB,Coronel,Cengage, “Data Base SystemConcepts”.

Web Links:

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.tutorialspoint.com/dbms/index.htm
4. https://www.studytonight.com/dbms/
5. https://www.geeksforgeeks.org/dbms/
6. https://www.w3schools.in/dbms/

Student Activity

1. Assignments (on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (in dividual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))

P.B. SIDDHARTHA COLLEGE OF ARTS AND SCIENCE: VIJAYAWADA-10.
(An Autonomous college in the jurisdiction of Krishna University, Machilipatnam)
MODEL Question Paper: 2020-2021

TITLE: DATABASE MANAGEMENT SYSTEMS **COURSE CODE: DSCT41**
SECTIONS: B.Sc. (MSDS) **SEMESTER: IV**
TIME: 3 Hrs. **MAX: 75M**

SECTION –A

ANSWER ANY FIVE QUESTIONS **5 X 5 =25 M.**

1. Illustrate the Levels of abstraction in the DBMS. {CO1, L2}
2. Illustrate different types of attributes used in E-R Model. {CO1, L2}
3. Explain basic operations of the relational algebra with suitable examples. {CO2, L2}
4. Explain briefly about aggregate operations used in SQL. {CO2, L2}
5. Define redundancy? Explain the problems caused by redundancy. {CO3, L3}
6. Define Schedule. Illustrate with examples serial and interleaved schedules. {CO4, L3}
7. Elaborate the concepts of Tree-Based Indexing. {CO5, L3}
8. Construct a B+ tree to insert the following key values (Order of the tree is three): 32,11, 15, 13, 7, 22, 15, 44, 67, 4. {CO5, L4}

SECTION – B

ANSWER ALL THE QUESTIONS **5 X 10 =50 M.**

9 A) Compare Database approach verses File processing approach. {CO1, L3}

(Or)

B) Illustrate the structure of a database system with neat diagram. {CO1, L3}

10 A) Describe integrity constraints that can be specified on a relation in detail. {CO2, L3}

(Or)

B). Explain DDL, DML commands in SQL with syntax and examples. {CO2, L3}

11 A) Define Normalization? Analyze 1NF and 2NF with examples. {CO3, L3}

(Or)

B) Differentiate between 3NF and BCNF with your own examples. {CO3, L3}

12 A) Explain in detail about ARIES algorithm. {CO4, L3}

(Or)

B) Illustrate Two–Phase locking protocol and Strict Two–Phase locking protocol with example transaction schedules. {CO4, L3}

13 A) Illustrate the concepts of Static Hashing {CO5, L3}

(Or)

B) Explain in detail about Indexed Sequential Access Method (ISAM). {CO5, L2}

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Parvathaneni Brahmayya Siddhartha College of Arts & Science, Vijayawada-10
(An Autonomous College under the jurisdiction of Krishna University)
Reaccredited at the level 'A^{+}' by the NAAC
College with Potential for Excellence
(Awarded by UGC)

DEPARTMENT OF ENGLISH

Course Structure and Syllabi under CBCS

Sl No.	Semester	Course Code	Name Of The Subject	Teaching Hours	Credits
1	**III Semester**	**ENGT02**	**Business English-III**	4	3

OBJECTIVE: The main objective of this course is to facilitate the learners to acquire the linguistic competence essentially required in a variety of life situations and develop their intellectual, personal and professional abilities.

COURSE OUTCOMES:

At the end of the course, the learners will be able to:

CO 1. Write an inter-office memorandum, press release and fax for performing day-to-day professional tasks and relate the situations in which these forms of communication are generally used. **PO 2**

CO 2. Understand the role of meetings in business transactions and figure out how to call a meeting, how to conduct and participate in a meeting, how to record the minutes and if necessary, how to write a note of dissent. **PO6**

CO 3. Inscribe a job-application letter, prepare a striking resume and also chart how letters of appointment and resignation are written. **PO1**

CO 4. Prepare for a face-to-face job interview, carry out oneself when being interviewed and also quiz the candidates, if required. **PO7**

CO 5. Participate in group discussions as an instrument for training in spoken English and imbibe the skills required for an effective participation. **PO1**

CO-PO MATRIX- ENG T02							
CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2						H	
CO3	H						
CO4							H
CO5	H						

P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF ENGLISH

Course Structure and Syllabi under CBCS

Course Code: ENG T02 **Max Marks: 75**

Title: Business English-III **Time: 3 hours**

SEMESTER III **No. of Credits: 3**

FOR BBA, BBA BA, B.COM AF, B.COM TPP, BPM, B.SC MSDS, CSCS

SYLLABUS

UNIT – I MEMORANDUM page-340-347

- Communication Core
- Function and Structure
- Types
- Press Release 10 hrs
- Other Short Messages
- Review Questions
- Exercises

UNIT – II NOTICES.AGENDA AND MINUTES page- 349-356

- Communication Core
- Notices
- Agenda
- Minutes 10 hrs
- Note of Dissent
- Review Questions
- Exercises

UNIT – III APPLICATION FOR JOBS page- 361-379

- Communication Core
- Importance and Function
- Drafting the Application
- Elements of Structure
- Preparing the Resume 10 hrs
- Helpful Hints
- Job Offer
- Resignation Letter
- Review Questions
- Exercises

UNIT – IV EMPLOYMENT INTERVIEW page-381-391

- Communication Core
- Types of Interview
- Preparing for the Interview
- Attending the Interview
- Interview Process
- Employers' Expectations

- Telephone Interview
- Negotiating a Job Offer 15 hrs
- Thank –You Letter
- Conducting an Interview
- Negative Aspects
- Sample Interviews for a Job
- Review Questions
- Exercises

UNIT – V GROUP DISCUSSION page-392 - 495

- Communication Core
- Definition
- Process
- Guidelines
- Helpful Expressions
- Group Discussion and Campus Interview
- Evaluation 10 hrs
- Evaluation Sheet
- Review Questions
- Exercises
- Abbreviations and Numerals
- Communication Core
- Abbreviations
- Numerals

Business Correspondence and Report Writing
R. C. Sharma and Krishna Mohan, Fifth Edition, Tata McGraw-Hill Publishing Company, Chennai, 2016

Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
I	MATT 44	CORE	MATHEMATICS FOR DATA SCIENCE	100	30	70	6	5

Course Outcomes of MATT44

S. No	C.O	
	Upon successful completion of this course, students should have the knowledge and skills to:	
1	Evaluate system of equation's by Cramer's rule ,Matrix inversion method, Gauss elimination method	
2	Evaluate problems on PDNF and PCNF.	
3	Define various types of graphs	
4	Evaluate Hamiltonian paths and circuits	
5	Distinguish various types of trees and their properties	

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1					**H**		
CO2					**M**		
CO3						**M**	
CO4							**L**
CO5							**L**

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE:VIJAYAWADA-10

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	MAT T44	2020 – 21 onwards	B.Sc (MSDS)

MATHEMATICS FOR DATA SCIENCE

SEMESTER-II **No of Credits: 5**

OBJECTIVES: 1. TO ENHANCE THE COMPUTATIONAL SKILLS AND APPLICATION SKILLS.

UNIT I: MATRICES (18 hrs)

1.1 Definition, addition and multiplication of matrices, various types of matrices,
1.2 Determinant of a square matrix, Inverse of a matrix.
1.3 Solution of system of non homogeneous linear equations by Cramer's rule
1.4 Matrix inversion method
1.5 Gauss Jordan method

UNIT II: MATHEMATICAL LOGIC (18 hrs)

2.1 Connectives, Negation, Conjunction, Disjunction, Conditional and Bi-Conditional statements.
2.2 Well formed formulae, Tautologies, Equivalence of formulae, Duality.
2.3 Tautological implications functionally complete set of connectives.
2.4 Principal Disjunctive Normal Forms (using truth tables).
2.5 Principal Conjunctive Normal Forms (using truth tables).

UNIT III: GRAPHS (18 hrs)

3.1Graphs, Simple Graph, Multiple Graph, Undirected and Directed graph, degree of vertex, the Handshaking theorem.
3.2 Travelling Salesman problem, types of Graphs
3.3 Sub graphs and Isomorphism of graphs
3.4 Operations of graphs.
3.5 Adjacency and Incidence matrix
3.6 Paths, cycles, connectivity

UNIT IV:CONNECTED GRAPHS (18 hrs)

4.1 Connectedness in undirected graph
4.2 Cut vertex, cutset, bridge
4.3 Connectedness in directed graphs
4.4 Edge connectivity.
4.5 Euleriangraph, Eulerian trail, Eulerian Circuit, Euler Circuit, Euler path
4.6Theorems on Eulerian graphs – related problems
4.7 Hamilton circuits, Hamilton path, Hamilton graph.

UNIT V:TREES **(18 hrs)**

5.1 Trees, properties, distance and centres in trees.
5.2 Rooted and binary trees, spanning trees, shortest spanning trees.
5.3 Weighted graph, minimal spanning trees Kruskal's algorithm and Prim's algorithm.
5.4 Tree traversals.

Student Activities:

1) **Class-room activities:** Power point presentations, Assignments
2) **Library activities:** Visit to library and preparation of notes for Assignment problems.
3) **Activities in the Seminars, workshops and conferences:** Participation/presentation in seminar/workshop/conference.

CO-CURRICULAR ACTIVITES:

- Quiz Competitions, Seminars
- Group Discussions

WEB LINKS:

http://mathssnsce.weebly.com/uploads/2/5/0/1/25011348/unit-3.pdf
https://www.britannica.com/topic/graph-theory

Prescribed Text book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	J.L. Mott, A.Kandel, T.P.Baker.	Discrete mathematics for computer scientists and mathematics.	Prentice – Hall of India Private Limited.	2nd Edition – 2009.
2.	J.P Tremblay and R.Manohar	Discrete mathematical structures with Applications to Computer Science.	Tata McGraw-Hill	1997.
3.	V. Venkateswara Rao, N. Krishna Murthy.	A text book of Mathematics for B.A/B.Sc Vol – III.	S. Chand Publication	2006

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	J.A.Bondy and U.S.R.Murthy	Graph theory with Applications	Mac.Millan Press	
2.	Introduction to Graph theory	S.Arumugham and S.Ramachandran	Scitech Publications, Chennai-17	

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE :: VIJAYAWADA-10.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

SEMESTER –II

MODEL QUESTION PAPER (w.e.f 2022-23)

COURSE CODE : MAT T28
TITLE OF THE PAPER : MATHEMATICS FOR DATA SCIENCE
Time: 3hrs. Max. Marks: 70

Answer ALL Questions

SECTION – A (5 x 4 = 20 Marks)

1.(a) Solve the equations $x + y + 2z = 4, 3x + y - 3z = -4, 2x - 3y - 5z = -5$ by Cramer's rule. (CO1, L3)

(OR)

(b) Find the inverse of the matrix A = $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ (CO1, L3)

2.(a) Define Conjunction and Disjunction (CO2, L1)

(OR)

(b) Construct the truth table for $\sim P \vee Q$ (CO2, L1)

3. (a) Show that the degree of the vertex of a simple graph G on n vertices cannot exceed n-1 edges (CO3, L3)

(OR)

(b) Explain travelling sales man problem (CO3, L3)

4.(a) Explain edge connectivity, vertex connectivity with examples. (CO4, L3)

(OR)

(b) Give an example of a graph which contains an Eulerian circuit that is also a Hamiltonian cycle. (CO4, L3)

5.(a) Explain BFS algorithm. (CO5, L3)

(OR)

(b) Define binary tree with example. (CO5, L3)

Answer ALL Questions

SECTION – B (5 x 10 = 50 Marks)

6.(a) Solve the equation $x + 2y + z = 4, 2x + y = 3, x + z = 2$ by using Gauss Jordan method (CO1, L3)

(OR)

(b) Solve the equations $x + y + z = 6; 3x + 3y + 4z = 20; 2x + y + 3z = 13$ using Matrix-Inversion method. (CO1, L3)

7.(a) Prove that $[(p \wedge \sim q) \rightarrow r] \rightarrow [p \rightarrow (q \vee r)]$ is a tautology. (CO2, L3)

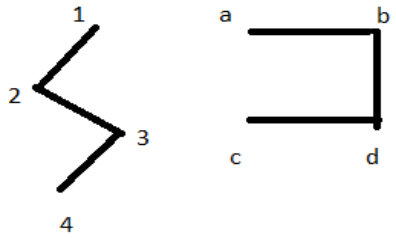
(OR)

(b) Obtain the PDNF of $P \vee (\sim P \longrightarrow (Q \vee (\sim Q \longrightarrow R)))$ (CO2, L3)

8.(a) Prove that Kurtowski's graph K_5 is non planar (CO3, L3)

(OR)

(b) Show that the two graphs shown in the figure are isomorphic (CO3, L3)

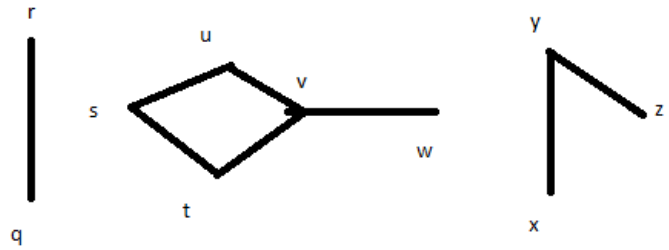


9. (a) Find the

i) Vertex sets of the components

ii) Cut vertices

iii) Cut edges of the graph given below (CO4, L3)



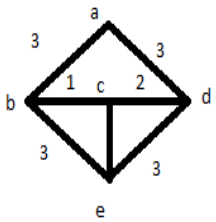
(OR)

(b) Show that the edge connectivity of a graph G cannot exceed the minimum degree of a vertex in G i.e., λ (G)$\leq \delta$(G) (CO4, L3)

10. (a) Define Spanning tree and show that a simple graph G has a spanning tree iff G is connected. (CO5, L3)

(OR)

(b) Using Kruskal's algorithm to find a minimal spanning tree for the graph (CO5, L3)



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PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE VIJAYAWADA - 520 010

An Autonomous College in the jurisdiction of Krishna University, Machilipatnam. A.P., India

STATISTICS	STAP41A	2019-20	B.A. (EMS) & B.Sc. (MSCs, MSDs, CaMS)

SEMESTER – IV **PAPER – IV** **No. of credits: 1**

Parametric and Non- Parametric Tests

Title of the course : **Parametric and Non- Parametric Tests**		
Course Outcome	**Course: STAP41A** Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	Able to apply the concept of hypothesis to illustrate various cases.	PO5
CO 2	Draw the inferences of various large samples.	PO6
CO3	Draw the inferences of various small samples.	PO6
CO 4	Applying parametric and non – parametric methods for one and two samples.	PO5
CO 5	Applying Analysis of variance for various cases in real life	PO5

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAP41A	**CO1**					**M**		
	CO2						**H**	
	CO3						**H**	
	CO4					**H**		
	CO5					**H**		

1. Large sample tests for

   (a) Single mean

   (b) Difference of means

   (c) Single proportion and

   (d) Difference of proportions

2. Large sample tests for

   (a) Difference of standard deviations and

   (b) Difference of correlation coefficients

3. Small sample tests for

   (a) Single mean

   (b) Difference of means and

   (c) Paired t-test.

4. Small sample test for

   (a) Single variance

   (b) Difference of variances.

5. Nonparametric tests for

   (a)Single sample -sign test

   (b)Wilcoxon signed rank test and

   (c)Single sample runs test.

6. Nonparametric tests for

   (a) Two independent samples- Median test,

   (b)Wilcoxon Mann Whitney– U test,

   (c)Wald - Wolfowitz's run test

7. Test for several means: ANOVA

   (a)One-way and

   (b)Two- way classifications.

List of Reference Books:

1. B.A/B.Sc. Second Year Statistics (2010) , Telugu Akademi, Hyderabad.
2. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and Chris P.Tsokos Academic Press(Elsevier), Haryana .
3. Fundamental of Statistics, 2019, S.C.Gupta, Himalaya Publishing House, Mumbai.
4. 100 statistical tests, 3rd Edition, Gopal K.Kanji, SAGE Publications, New-Delhi

External examination for 50 Marks

(i) Continuous evaluation – 10 Marks
(ii) External Evaluation – 40 Marks

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PARVATHANENI BRAHMAYYASIDDHARTHACOLLEGE OF ARTS & SCIENCE VIJAYAWADA - 520 010

An Autonomous College in the jurisdiction of Krishna University, Machilipatnam. A.P., India

STATISTICS	STAT41A	2020-21	B.A. (EMS) & B.Sc. (MSCS)

SEMESTER – IV **PAPER – IV** **No. of credits : 3**

Title of the course :**Testing of Hypothesis**

Title of the course :Testing of Hypothesis

Course Outcome	**Course:STAT41A** Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	To compute best critical region, its size and power of the test to different situations and apply the Neyman-Pearson lemma for testing simple hypotheses.	PO5
CO 2	To analyze data pertaining to sampling of attributes and variables to interpret the results.	PO5
CO3	To analyze data using t-test and F- test to interpret the results.	PO5
CO 4	To analyze data pertaining to non-parametric and to interpret the results.	PO5
CO 5	Understand the application of ANOVA	PO5

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAT41A	**CO1**					**M**		
	CO2					**H**		
	CO3					**H**		
	CO4					**H**		
	CO5					**M**		

Unit I

Testing of hypothesis: Concepts of statistical hypotheses, Simple, Composite, Null and Alternative hypothesis, Critical region, types of errors, Level of significance , power of a test and p-value, One and two tailed tests, Neyman-Pearson Lemma, Examples in case of Binomial, Poisson, Exponential and Normal distributions and their powers.

Unit II

Large Sample Tests: Sampling of Attributes- Test of significance for single and difference of proportions, confidence intervals for proportion(s).**Sampling of variables** -Test of significance for Single and difference of means, Confidence intervals for mean(s) and Test of significance for difference of Standard deviations and simple problems.

Unit III

Small Sample Tests: t- test for single mean, difference of means, paired t test and correlation coefficient. F-test for equality of two population variances.Fisher's Z- transformation for difference of correlation coefficients.

Unit IV

ANOVA: Introduction, assumptions, one way classification for fixed effect model(with one observation per cell),Two way classification for fixed effect model(with one observation per cell) and simple problems.

Unit V

Non-Parametric Methods : Non-parametric tests- advantages and disadvantages, Measurement scales - nominal, ordinal, interval and ratio. **(i) One sample tests** : Sign test, Run test, Wilcoxon-signed rank test **(ii) Two sample tests** : Median test, Wilcoxon- Mann Whitney U - test, Kruskal Wallis test and simple problems.

Text Book: Fundamentals of Mathematical Statistics, 12th Edition, 10th September 2020, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi.

Recommended References books:

1. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and Chris P.Tsokos Academic Press(Elsevier), Haryana .
2. Probability and Statistics,Volume I, D.Biswas, New central book Agency (P) Ltd, New Delhi.
3. An outline of Statistical theory, Volume Two,3rd Edition,2010(with corrections) A.M.Goon,M.K. Gupta, B.Dasgupta ,The World Press Pvt.Ltd., Kolakota.
4. Sanjay Arora and BansiLal:. New Mathematical Statistics, SatyaPrakashan , New Delhi.

Websites of Interest: http://onlinestatbook.com/rvls/index.html

Co-Curricular Activities in the class:

1. Pictionary

2. Case Studies on topics in field of statistics

3. Snap test and Open Book test

4. Architectural – To be build the procedures

5. Extempore – Random concept to students

6. Interactive Sessions

7. Teaching through real world examples

Model Paper Structure

Section A: Answer FIVE questions out of EIGHT questions (5 x 5M= 25 M)

Section B: Answer FIVE questions out of FIVE questions with internal choice.(5 x 10M = 50M)

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PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE:VIJAYAWADA-10.

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

STATISTICS	STAT41A	2020-2021	B.A. (EMS) & B.Sc. (MSCs, MSDs, Ca.M.S)

WITH EFFECT FROM 2019-20

Testing of Hypothesis

Model Paper

SECTION – A

Answer any five of the following.

1. Define the following terms (CO1, L1)
   (a) simple hypothesis (b) Composite hypothesis
   (b) Null hypothesis (d) Alternative hypothesis
2. Discuss about one and two tailed tests (CO1, L2)
3. Explain the test procedure for testing the single proportion (CO2, L2)
4. Explain the test procedure for testing the difference of means in small samples (CO3, L2)
5. Obtain the 95% and 99% confidence intervals for difference proportions if the sample size, n is large. (CO2, L3)
6. Explain Fisher's Z-transformation for difference of correlation coefficient. (CO3, L2)
7. Write any four advantages and disadvantages of non-parametric tests. (CO4, L1)
8. Explain the meaning of Analysis of Variance and give its uses. (CO3, L2)

SECTION – B

Answer all the questions

9. (a) State and prove Neyman – Pearson Lemma. (CO1, L5)

(OR)

(c) Find the best critical region for testing $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda = \lambda_1$ (CO1, L5)

10. (a) A random sample of 1200 men from a state gives the mean pay off Rs 400/- per month and with a standard deviation of Rs 60/-. Another independent sample of 1000 men from another state gives the mean pay off Rs 500/- per month and with a standard deviation of Rs 80/-. Discuss whether the mean levels of pay off from

the two states differs significantly are not at 5% level of significance. Also obtain the 95% confidence limits for the difference of two population means.

(CO2, L4)

(OR)

(b) A cigarette manufacturing firm claims that its brand A of cigarette out sells its brand B by 8% it is found that 42 out of a sample of 200 smokers prefer brand A and eighteen (18) out of another random sample of 100 smokers prefers brand B. test whether the 8% difference is a valid claim (CO2, L4)

11. (a). Two different types of drugs A and B were tried on certain patients for increasing weight, the increase in weight in pounds are given below.

Drug A	8	12	12	9	3		
Drug B	10	8	12	15	6	8	11

Do the two drugs differ significantly with regard to their effect in increase weight (CO3, L5)

(OR)

(b). The nicotine content in milligrams in two samples of tobacco were found as follows

Sample A	24	27	26	21	25	
Sample B	27	38	28	31	22	36

can it be said that two samples came from same normal population

(CO3, L5)

12. (a). Explain the procedure of Wilcoxon- Mann Whitney U test (CO4, L5)

(OR)

(b). Explain the test procedure of Median test for two samples (CO4, L5)

13. (a). What is two- way classification with one observation per cell in ANOVA.

(CO3, L5)

(OR)

(b) There are four doctors, if they wish to test the five medicines, they applied these five medicines on four patients each and following results were

obtained. Test the significance between the medicine and doctors at 1% level of significance. (CO3, L5)

Doctors	Medicines				
	A	B	C	D	E
1	12	16	18	21	24
2	16	25	20	23	28
3	14	20	23	16	20
4	15	24	23	25	36

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE :: VIJAYAWADA-520 010.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

SEMESTER–III/IV **Credits – 3**

TITLE OF THE PAPER: HINDI–III **COURSE CODE:HINT0I**

HINDI -III 2018-2019

COURSE NAME	COURSE OUTCOMES	COURSE OUTCOMES	PO'S
HINT01	CO1	दोहों के द्वारा विद्यार्थियों में समाज सुधारता, मानव मूल्यों बढते हैं।	PO3
	CO2	हिन्दी साहित्य का इतिहास के द्वारा हिन्दी भाषा की प्रामुख्यता और कविताओं की प्रामुख्यता मिल जाती हैं।	PO1
	CO3	समाज कल्याण विषयों के लिए समझकर अपना ज्ञान बढ हो जाते हैं।	PO2
	CO4	समाज में भाषा पर प्रामुख्यता, भाषा में ज्ञान प्राप्त करके , दूसरों से आसानी से संप्रेषित करना सीखेंगे।	PO1
	CO5	सरकारी व्यवस्थाओं को लेख लिखना, भाषा की विशेषता , समाज में सरकारी भाषा सीखकर दूसरों को आदर्शवान बन सकेंगे।	PO6

CO-PO MATRIX

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			H				
CO2	L						
CO3		M					
C04	M						
CO5						H	

I. काव्य दीपः

1. **कबीरदास - साखी -** 1-10 (Offline Teaching-5 Hours)
2. **सूरदास का बाल वर्णन** (Offline Teaching-4 Hours)
3. **मातृभूमि** (Offline Teaching-5 Hours)
4. **तोडती पत्थर** (Offline Teaching-4 Hours)
5. **गीत फरोश** (Online Teaching-5 Hours)

II. हिन्दी साहित्य का इतिहास : (Offline Teaching-17 Hours)

काल विभाजनः

वीरगाथा काल की परिस्थितियाँ

वीरगाथा काल की विशेषताँए

भक्तिकाल :

1. **ज्ञानाश्रयी शाखा - कबीर**
2. **प्रेमाश्रयी शाखा - जायसी**

III. साधारण निबन्ध :

1. **समाचार पत्र** (Offline Teaching-2 Hours)
2. **बेकारी की समस्या** (Offline Teaching-2 Hours)
3. **कम्प्यूटर** (Online Teaching-2 Hours)
4. **पर्यावरण और प्रदूषण** (Offline Teaching-2 Hours)
5. **साहित्य और समाज** (Online Teaching-2 Hours)

IV. अनुवाद (Online Teaching-5 Hours)

V. प्रयोजनमूलक हिन्दी :

1. **परिपत्र** (Offline Teaching-2 Hours)
2. **ज्ञापन** (Offline Teaching-2 Hours)
3. **सूचना** (Online Teaching-1 Hours)

Reference Books:

प्रामाणिक आलेखन और टिप्पण

मिलिन्द प्रकाशन, Hyderabad-95, Degree Second Year Text Book, Vikram Publishers Pvt. Ltd., Durga Agraharam, Vijayawada-2

MODEL PAPER

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE :: VIJAYAWADA-520 010.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

SEMESTER–III/IV **Credits – 3**

TITLE OF THE PAPER: HINDI–III **COURSE CODE:HINT0I**

No. of Pages: 2	**Roll No.:**	**Max. Marks: 75M**
Time: 3 Hrs.	**No. of Questions: VII**	**Pass Min. : 30M**

I. ***निम्न लिखित पद्यांशों की संदर्भ सहित व्याख्या कीजिए :-*** *L2* **2 X 8 = 16M**

(अ) **(i) पाहन पूजे हरि मिलै, तो मैं पूजूँ पहाड ।**
ताते ये चाकी भली, पीस खाय संसार ।।

अथवा

(ii) सोभित कर नवनीत लिए ।
धुटुरूनि चलत रेनु-तन मंडित, मुख दधि लेप किए ।।
चारू कपोल, लोल लोचन, गोरोचन तिलक दिए ।
लट-लटकनि मनमत मधुप-गत, मादक मधुहि पिए ।।
कठुला-कंठ वज्र केहरि-नख, राजत रूचिर हिए ।
धन्य सूर एको पल इहिं सुख, का सत कल्प जिए ।।

(आ) **(i) हमें जीवनाधार अन्न तू ही देती है,**
बदले में कुछ नहीं किसी से तू लेती है ।
श्रेष्ठ एक से एक विविध, द्रव्यों के द्वारा,
पोषण करती प्रेम भाव से सदा हमारा ।
हे मातृभूमि! उपजे न जो तुझ पर कृषि अंकुर कभी ।
तो तडप-तडप कर जल मरें जठरानल मे हम सभी ।

अथवा

(ii) गर्मियों के दिन,
दिवा का तमतमाता रूप,
उठी झुलसाती हुई लू,
रूई ज्यों जलती हुई भू,
गर्द चिनगी छा गई,
प्रायः हुई दोपहर -
वह तोडती पत्थर ।

II. *किसी एक कविता का सारांश लिखिए ।* *L1* **12M**

1. तोडती पत्थर 2. गीत फरोश

III. *(अ)* वीरगाथा काल की विशेषताएँ बताइए । *L1* **12M**

अथवा

(आ) ज्ञानमार्गी शाखा के प्रवर्तक के रूप में कबीरदास का परिचय दीजिए ।

IV. *किसी एक कवि का परिचय दीजिए ।* *L1* **5M**

1. सूरदास
2. सूर्यकांत त्रिपाठी निराला

V. *किसी एक विषय पर निबंध लिखिए ।* *L2* **10M**

1. समाचार पत्र
2. साहित्य और समाज

VI. *(अ) गद्यांश पढ़कर निम्न लिखित प्रश्नों का उत्तर दीजिए ।L3* **5 X 1 = 5M**

भारत के पश्चिय में राजस्थान नामक राज्य है । यहाँ के लोग बडे वीर और देश व धर्म पर आत्मोत्सर्ग करने वाले होते हैं । पगडी बाँधने का यहाँ पर विशेष रिवाज है । यहाँ पर रेगिस्थान है । यहाँ पर इस्लाम का प्रभाव कम पाया जाता है । पूरब के लोग बंगाली कहलाते हैं । ये लोग अपने सिर पर टोपी नहीं पहनते थे । ये बहुधा कोट, कमीज और बंगाली धोती पहनते हैं । पंजाब और बंगाल के बीच में उत्तर प्रदेश और बिहार है । यहाँ पर सब जातियों के लोग दिखाई पडते हैं ।

प्रश्नः-

1. भारत के पश्चिम में कौन-सा राज्य है?
2. राजस्थान के लोग किस प्रकार के होते है ?
3. पूरब के लोग क्या कहलाते हैं ?
4. बंगाल और पंजाब के बीच कौन-कौन सा राज्य है ?
5. बंगाली के लोग बहुधा क्या पहनते है ?

(आ) प्रयोजनमूलक हिन्दी में कोई एक पत्र लिखिए । *L2* **5M**

1. परिपत्र 2. ज्ञापन

VII. *हिन्दी में अनुवाद कीजिएः-* *L2* **10M**

Vidyasagar was a very generous and charitable man. From his earliest year he helped the poor and needy to the almost of his power. As a boy at school he often gave the little food to another boy who had none. If one of his fellows fell ill, little Eswar would go to his house, sit by his bed and nurse him. His name become a household word in Bengal. rich and poor, high and low, all loved him alike. No beggar ever asked him for relief invain. He would never have a porter at his gate lest some poor man who wished to see him might be turned away.

Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
III	MATT34	CORE	LINEAR ALGEBRA & MATRICES	100	25	75	6	5

Course Outcomes of MATT34

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S. No	C.O
	Upon successful completion of this course, students should have the knowledge and skills to:
1	Define Vector space, Quotient space, Direct sum, linear sum, linear independence and basis.
2	Define Inner product and prove Schwartz inequality, Gram schmidt orthogonalisation process.
3	Discuss the linear transformations, Rank and Nullity.
4	Solve linear system of equations by direct and determine Eigen values and vectors, also compute power, inverse of the matrix using Cayley-hamilton theorem.
5	Solve system of linear algebraic equations using LU, Choleski, Tridiagonal decompositions and singular value decomposition.

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1					**H**		
CO2					**H**		
CO3						**M**	
CO4							**M**
CO5							**L**

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE::VIJAYAWADA-10.

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	MAT T34	2020 – 21 Onwards	B.SC(MSDS)

LINEAR ALGEBRA & MATRICES

SEMESTER-III **PAPER - III** **No of Credits: 5**

OBJECTIVE: TO ENHANCE THE ANALYTICAL SKILLS AND APPLICATION SKILLS.

UNIT I: Vector spaces (20 hrs)

1.1 Vector space definition – general properties of Vector space.
1.2 subspace definition and related problems only, linear sum of two subspaces, linear combination of vectors and linear span of a set – theorems & related problems.
1.3 Linear dependence & Linear independence of vectors related problems only.
1.4 Basis of a vector space – definition, Basis existence, Basis extension, Basis Invariance theorems.
1.5 Dimension of a vector space theorems & related problems, Quotient space, dimension of Quotient space - theorems.

UNIT II: Inner product spaces (15 hrs)

2.1 Inner product spaces – definition, Norm (or) Length of a vector - theorems & related problems.
2.2 Schwarz in equality, Triangle inequality, parallelogram law – theorems.
2.3 Orthogonality – orthogonal, orthonormal vectors, orthogonal set, and orthonormal sets of I.P.S - theorems & related problems.
2.4 Gram- Schmidt orthogonalisation process problems only, Bessel's Inequality.

UNIT III: Linear Transformation (15 hrs)

3.1 Linear transformation, Properties of L.T., Determination of L.T. - theorems & related problems.
3.2 Range & Null space of a L.T. – Definitions, theorems & related problems.
3.3 Rank nullity theorem - related problems.
3.4 Singular and Non – Singular linear transformations and related problems only.

UNIT IV: Matrices (25 hrs)

4.1 Rank of a matrix – definition, related problems.
4.2 Echelon form of a matrix, reduction to normal form, PAQ form, Inverse of a matrix - related problems only.
4.3 System of linear equations – homogeneous & non homogeneous linear equations - related problems only.
4.4. Eigen values & Eigen vectors of a matrix – definitions, theorems & related problems.
4.5 Cayley - Hamilton theorem, related problems.

UNIT V: Matrix Factorization Techniques (15 hrs)

5.1 LU Decomposition Method problems only.
5.2 Choleski Decomposition method problems only.
5.3 Tri diagonal system problems only.
5.4. Singular value Decomposition problems only.

Prescribed Text book:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	V. Venkateswara Rao, N. Krishna Murthy.	A text book of Mathematics for B.A/B.ScVol – III. (Pg No: 111-192; 232 – 321 & 339 – 389; 395 – 434).	S-Chand & Co.	2006
2.	S.R.K.Iyengar & R.K.Jain	Mathematical Methods	Narosa	2010

Reference Text books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	J.N. Sharma and A. R. Vasistha	Linear Algebra	Krishna PrakashanMandir Meerut-250002.	
2.	Dr. A. Anjaneyulu	A Text Book of Mathematics B.A/B.Sc – Vol III	Deepthi Publications	3rd Edition 2006 - 2007

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE:: VIJAYAWADA-10.
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SEMESTER – III **Model Paper** **PAPER – III**
COURSE CODE : MAT T34 Time: 3hrs.
TITLE OF THE PAPER : LINEAR ALGEBRA& MATRICES Max. Marks: 75

SECTION – A

Answer any **FIVE** of the following questions **5X5=25M**

1. The set W of ordered triads (x, y, 0) where x, y ϵ F is a subspace of $V_3(F)$. (C01, L2)
2. If two vectors are linearly dependent, prove that one of them is a scalar multiple of the other. (C01, L2)
3. State & prove the Triangle Inequality. (C02, L4)
4. Describe explicitly the linear transformation T: $R^2 \rightarrow R^2$ such that T(2, 3) = (4, 5) and T(1, 0) = (0,0). (C03, L2)
5. Define Singular and Non – Singular linear transformation. (C03, L2)
6. Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$. (C04, L2)
7. Solve the system $2x_1 - x_2 + x_3 = 0$, $3x1 + 2x_2 + x_3 = 0$, $x1 - 3x_2 + 5x_3 = 0$. (C04, L2)
8. Show that zero is a characteristic root of a matrix if and only if the matrix is singular. (C04, L2)

SECTION -B

Answer the following questions. **5X10=50M**

9 (a) State and Prove Invariance Theorem. (C01, L2)

(OR)

9 (b). Let W be a subspace of a finite dimensional vector space V (F) then prove that dim V/W = dim V – dim W (C01,L2)

10(a) State and prove Cauchy – Schwarz's Inequality. (C02, L4)

(OR)

10(b) Given {(2,1,3), (1, 2, 3), (1, 1, 1)} is a basis of R^3; Construct an Orthonormal basis. (C02, L4)

11(a) State and prove Rank – nullity theorem. (C03, L2)

(OR)

11(b) Find T (x, y, z) where $T:R^3 \rightarrow R$ is defined by T (1 , 1, 1) = 3; T(0, 1 ,-2) = 1; T(0, 0, 1) = -2. (C03,L4)

12(a) Show that the only number λ for which the system $x + 2y + 3z = \boldsymbol{\lambda}x$, $3x + y + 2z = \boldsymbol{\lambda}y$, $2x + 3y + z = \boldsymbol{\lambda}z$ has non-zero solutions is 6. (C04,L2)

(OR)

12(b) State and prove Cayley – Hamilton theorem. (C04,L2)

13(a) Solve the system of equations 4x+y+z = 4, x+4y-2z = 4, 3x+2y-4z = 6 by LU Decomposition method. (C05,L2)

(OR)

13(b) Decompose the tri diagonal system $\begin{bmatrix} 4 & -1 & 0 & 0 \\ -1 & 4 & -1 & 0 \\ 0 & -1 & 4 & -1 \\ 0 & 0 & -1 & 4 \end{bmatrix}$ (C05,L2)

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE VIJAYAWADA - 520 010

An Autonomous College in the jurisdiction of Krishna University, Machilipatnam. A.P., India

STATISTICS	STAP31A	2020-21	B.A (E.M.S) & B.Sc. (M.S.Cs., Ca.M.S.& M.S.Ds.)

SEMESTER – III **Practical – III** **No. of credits : 2**

Probability Distributions and Statistical Inference -I

Title of the course : **Probability Distributions & Statistical Inference – I** **Course Code : STAP31A**		
Course Outcome	**Course:B.A(E.M.S)& B.Sc.(M.S.Cs, Ca.M.S. & M.S.Ds.)** Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	Fit the various continuous probability distributions	PO6
CO 2	Illustrate various applications of Chi-square distributions in statistics	PO5
CO 3	Able to compute the various continuous probability distributions using MS - Excel	PO6
CO 4	Analyze the goodness of fit by using distributions	PO5
CO 5	Able to compute the goodness of fit using properties.	PO6

CO-PO MATRIX								
COURSE CODE	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
STAP31A	CO1						M	
	CO2					M		
	CO3						H	
	CO4					M		
	CO5						M	

1. Fitting of Normal Distribution (Areas Method) – MS Excel (CO1, L3)
2. Fitting of Normal Distribution (Ordinates Method) – MS Excel(CO1,L3)
3. Fitting of Exponential Distribution – MS Excel (CO1,L3)
4. χ^2 – test for specified population variance. (CO2, L5)
5. χ^2 – test for independence of attributes. (CO2,L5)
6. χ^2 – test for goodness of fit (Using distributions) (CO2, L5)
7. χ^2 – test for goodness of fit (Using Proportions) (CO2,L5)

Text Book:1. Fundamentals of Mathematical Statistics, 11th Edition, 2010,
S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi

2. S.C. Gupta, (2016), Seventh Edition, Fundamentals of Statistics, Mumbai: Himalaya Publishing House.

Reference Manual: Question Bank with Procedures prepared by the department.

Model Paper Structure:

(a) Continuous assessment : 10 marks
(b) External Evaluation : 40 marks (perform any two practical's out of three, chosen from 8 practical's, each carries 20 marks)

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STATISTICS	STAT31A	2020-21	B.A(E.M.S) & B.Sc. (M.S.Cs., Ca.M.S.& M.S.Ds.)

EMESTER – III **PAPER – III** **No. of credits : 4**

WITH EFFECT FROM 2019-20

Probability Distributions and Statistical Inference -I

Mode of Teaching: Online -15P(25%) and Offline – 45P(75%)

Title of the course : Probability Distributions & Statistical Inference – I

Course Code : STAT31A

Course Outcome	**Course: B.A(EMS)& B.Sc. (MSCs, CAMS & MSDS)** Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	Obtained the knowledge of applications on Rectangular and Normal distributions in different situations	PO5
CO 2	Obtained the knowledge on standard continuous distributions namely Exponential, Gamma and Beta distributions	PO5
CO 3	Apply exact sampling distributions to different situations and to know the importance of order	PO5
CO 4	Estimate the parameters by various methods	PO6
CO 5	Able to learn parameter estimation by method of moments and MLE	PO6

CO-PO MATRIX								
COURSE CODE	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
STAT31A	CO1					M		
	CO2					H		
	CO3					M		
	CO4					L		
	CO5					M		

Continuous Distributions-I (Mode of teaching : offline -15P)

(i) Rectangular or Uniform Distribution: Probability density function, Moments- Mean and Variance, Moment generating function, Characteristic function, Mean Deviation about mean and problems.

(ii) Normal distribution- Probability density function, Normal distribution as a limiting form of binomial and Poisson distributions, Moment generating function,Cumulant generating function, Characteristic function, Moments of Normal distribution, Additive or reproductive productive property, Mean deviation about mean, area property, Importance of Normal distribution and problems.

Continuous Distributions-II (Mode of teaching : offline – 15P)

(i) Exponential distribution - Probability density function, mean and variance, Moment generating function, Lacks memory property, Additive or reproductive productive property.

(ii) Gamma Distribution : (one and two parameters)-Probability density function, Moment generating function, Cumulant generating function, Moments , Limiting form of gamma distribution, Additive property.

(v) Beta distribution of First & Second kinds: Probability density function, Mean and variance, Harmonic mean.

Exact Sampling Distributions and order Statistics: (Mode of teaching: online – 15P)

(i) Concepts of population, parameter, sample, statistic, sampling distribution of sample mean, sample variance and sample proportion, Standard error.

(ii) χ^2 **- distribution** – Definitions, Mean, Variance and Moment generating function. Additive Property and applications of χ^2 - distribution- Test for single variance, Goodness of fit, Independence of Attributes.

(iii) Order Statistics- Definition, Distribution function and probability density function of Maximum and Minimum order statistics uniform and exponential distributions only(formulae only).

Theory of Estimation –I (Mode of teaching: offline – 8P)

Definition, Criteria of good estimator- Consistency, Unbiasedness, Efficiency and Sufficiency, Statements of Factorization theorem and Fisher-Neyman criterion. Cramer –Rao inequality – Statement and proof, Lower bound for variance of estimator, Regularity conditions(statements only).

Theory of Estimation-II (Mode of teaching: offline – 7P)

Methods of Estimation - Maximum likelihood estimation (MLE), Method of moments estimation (MME), properties of Maximum likelihood estimators. Interval estimation-construction of confidence intervals for the parameters of Normal distribution, simple problems.

Text Book: Fundamentals of Mathematical Statistics, 11th Edition, 2010,
S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi

List of Reference Books:

1. B.A/B.Sc. Second Year Statistics(2010) , Telugu Akademi, Hyderabad.
2. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and Chris P.Tsokos Academic Press(Elsevier), Haryana .
3. Probability and Statistics,Volume I & II, D.Biswas, New central book Agency(P)Ltd, New Delhi.
4. An outline of Statistical theory, Volume II,3rd Edition,2010(withcorrections) A.M.Goon,M.K. Gupta, B.Dasgupta ,The World Press Pvt.Ltd., Kolakota.
5. Sanjay Arora and BansiLal:. New Mathematical Statistics, SatyaPrakashan , New Delhi.
6. Mathematical Statistics, 3rd edition, 2009, ParimalMukhopadhyay, Books & Allied(p) Ltd, Kolkata.

Model Paper Structure

Section A: Eight questions are to be set, of these five questions are to be answered.(5x5M= 25M)

Section B: Two questions from each unit with internal choice. (5 x 10M = 50M)

STATISTICS	STAT31A	2020-21	B.A (EMS) & B.Sc. (M.S.Cs., Ca.M.S & M.S.Ds.)

SEMESTER – III **Probability Distributions and Statistical Inference -I**

Max.Marks: 75M **Max.Time: 3Hrs**

Model Paper

Section – A

Answer any FIVE of the following **5 x 5M = 25M**

1. Write the properties of normal distribution (CO – 1, L – 2)
2. Find mean and variance of rectangular distribution(CO – 1, L – 4)
3. Find mean and variance of gamma distribution(CO – 2, L – 4)
4. Define beta distribution of first kind and find its mean(CO – 2, L – 1)
5. Define Chi-square distribution and write its applications(CO–3, L –1)
6. Define order statistic and obtain the distribution function of maximum order statistic(CO – 3, L – 1)
7. Explain the concept of point estimation of a parameter(CO – 4, L – 2)
8. Explain the Fisher's Neymann factorization criteria(CO – 4, L – 2)

Section – B

Answer the following **5 x 10M =50M**

9. **(a)** Show that mean, median and mode are equal in Normal Distribution (CO – 1, L – 3)

(OR)

(b) In a distribution exactly normal , 7% of the items are under 35and 89% are under 63. What are the mean and standard deviationof the distribution(CO – 1, L – 4)

10. (a) Find mean and variance of exponential distribution(CO–2,L–4)

(OR)

(b) Find m.g.f of gamma distribution(CO–2,L–4)

11. (a) Explain the following terms with examples (i) Population (ii) sample (iii) parameter (iv) statistic (v) standard error(CO–3,L–2)

(OR)

(b) Explain the procedure of testing the independence of attributes(CO–3,L–2)

12 (a) Explain the criteria of good estimator(CO–4,L–2)

(OR)

(b) Prove that sample variance is not an unbiased estimator of the population variance but finite population variance is an unbiased estimator of the population variance (CO–4,L–4)

13 (a) Find the MLE for the parameter of Poisson distribution(CO–4,L–4)

(OR)

(b) Find the MLE for the parameter of Poisson distribution(CO–4,L–4)

***

Code	Bloom's Taxonomy Levels	Code	Bloom's Taxonomy Levels
BTL1 :	Remembering	**BTL2** :	Understanding
BTL3 :	Apply	**BTL4** :	Analysing
BTL5 :	Evaluating	**BTL6** :	Creating

Course Code : TEL T01

COURSE NAME	COURSE OUT COMES NO	COURSE OUT COMES	PO NO.
B.A, BBA, BBA (BA) B.COM (GEN), B.COM (CA), B.SC (MPCS), B.SC (BZC), B.SC(MECS), B.SC (MSCA) B.A, BBA, BBA (BA) B.COM(GEN)B.COM (CA), B.SC(MPCS), B.SC(BZC), B.SC(MECS), B.SC(MSCA)	CO 1	ప్రాచీనపద్యభాగంగతవైభవాన్నిప్రవర్తనలనుతెలియజేయడంవలనమననాగరికతసంస్కృతితెలుసుకోవడానికి అవకాశం:	5
	CO 2	నూతనఆలోచనలుకలిగివాటినివ్యక్తీకరించినట్లయితే దాని వలన ప్రయోజనం	1
	CO 3	గ్రహించవలసినది సులభంగాగ్రహించితనభావాల్ని వ్యక్తీకరించేందుకు ఉపయోగపడటం	2
	CO 4	భాషలోని లయ సౌందర్యం అవగాహన చేసుకుని ఆచరించేందుకు సహకరించటం	2
	CO 5	వినడానికి వినసంపైన మాటల పొందిగా ఇందులో కనిపిస్తుంది	2

CO – PO MATRIX

Course Code : TEL T01

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1					H		
CO2	L						
CO3		L					
CO4		L					
CO5		L					

Telugu	TELT01	2019-20	B.A,B.Sc,,B.Com,B.Com Computers, Appilications, B.Com E-commerce,BBA,BBABA,B.Com TPP,BCA

SYLLABUS

semester –III & IV credits: 3

అభ్యసన ఫలితాలు

CO 1 ప్రాచీన పద్యభాగం గత వైభవాన్ని ప్రవర్తనలను తెలియజేయడం వలన మన నాగరికత సంస్కృతి తెలుసుకోవడానికి అవకాశం:

CO 2 : నూతన ఆలోచనలు కలిగి వాటిని వ్యక్తీకరించినట్లయితే దాని వలన ప్రయోజనం

CO 3 : గ్రహించవలసినది సులభంగా గ్రహించి తన భావాల్ని వ్యక్తీకరించేందుకు ఉపయోగపడటం

CO 4 : భాషలోని లయ సౌందర్యం అవగాహన చేసుకుని ఆచరించేందుకు సహకరించటం

CO 5: వినడానికి వినసంపైన మాటల పొందిగా ఇందులో కనిపిస్తుంది

ప్రాచీన కవిత్వం

1. వామనవతారం -పోతన

(శ్రీ మహా భాగవతం ఎనిమిదవ స్కంధం 582వ పద్యం నుండి 621)

2.శాలివాహన విజయం కొరవి గోపరాజు

(సింహాసనద్వాత్రింశికప్రథమ శ్వాసం 115 వ పద్యము నుండి 165 వ పద్యం వరకు)

3.ఆధునిక కవిత్వం

హరిజన శతకము -కుసుమ ధర్మన్న

వంటిల్లు -విమల

గద్యభాగం / వ్యాస సంపుటి

1. అభి వ్యక్తి నైపుణ్యాలు - సుబ్బారావు

2. వ్యక్తిత్వ వికాసం -ఆచార్య రాచపాలెం చంద్రశేఖరరెడ్డి

వ్యాకరణం

చందస్సు : ఉత్పలమాల, చంపకమాల,, శార్దూలం, కందం, తేటగీతి ,ఆటవెలది ,సీసం

అలంకారాలు : శబ్దాలంకారాలు, ఉపమా ,,ఉప్రేక్ష, రూపక ,స్వభావక్తి ,అతిశయోక్తి ,

అర్థాంతరన్యాసాలంకారాలు

Parvathaneni Brahmayya Siddhartha College of Arts and Science Vijayawada 520010
An autonomous college in the Jurisdiction of Krishna University. Machilipatnam)

Telugu	TELT01	2019-20	B.A,B.Sc,,B.Com,B.Com Computers, Appilications, B.Com E-commerce,BBA,BBABA,B.Com TPP,BCA

MODEL PAPER

semester –III & IV credits: 3

1.వామనవతార ఘట్టాన్ని విశ్లేషించండి (లేదా)

శాలివాహన విజయం పాఠ్యభాగ సారాంశం తెలపండి 15M

2.హరిజన శతకం ద్వారా కుసుమ ధర్మన్న ప్రబోధం విశ్లేషించండి (లేదా) 15M

విమల వంటిల్లును వర్ణించిన వైఖరి వివరించండి

3.ఈ క్రింది వానిలో రెండింటికి సందర్భ సహిత వ్యాఖ్యలు రాయండి 2X5=10M

1.మాట తిరగలేరు మానవధనులు

2. ధరణి ఏటి పుణ్య చరితుడగును

3. మాయ బుద్ధి చూడ మచ్చుకైనను లేదు

4.ఇంట్లో అమ్మలంతా ఇక్కడే స్త్రీలయ్యారు

4. ఈ క్రింది వానిలో మూడింటికి సమాధానాలు రాయండి 3X5 =15M

1.వామన మూర్తి విశ్వరూపాన్ని పోతన వర్ణించిన విధానం తెలపండి

2. విక్రమార్కుని ఇంద్రుడు సింహాసనాన్ని బహుకరించిన విధానం తెలపండి

3.పాటుపడుట పరుగుచేటు కాదన్నాడు కుసుమ ధర్మన్న వివరణ

4. వంటిల్లు సందేశాన్ని సంక్షిప్తంగా రాయండి

5. వ్యక్తిత్వ వికాసం విశిష్టతను తెలియజేయండి (లేదా)

అవి వ్యక్తి నైపుణ్యాలను విశ్లేషించండి 10M

6. ఈ క్రింది పద్య పాదానికి ఘన విభజన చేసి ఏ పద్య పాదము తెలిపి యతిప్రాసనను 5M
గుర్తించండి

రవిబింబం ఉపమావింప చాత్రం మగు చత్రం భయ్ శిరోరత్నమై (లేదా)

శార్దూల పద్య పాదానికి ఘన విభజన చేసి యతిప్రాసులు గుర్తించండి

7. ఈ క్రింది పద్యంలోని అలంకారాన్ని గుర్తించి సమన్వయం చేయండి 5M

ఆదిన్ శ్రీపతి కొప్పుపై తనువుపై సంస్తోతరియంబుపై
పాదాబ్జంబులపై కపోతలటిపై పాలిండ్లపై నూతన
మర్యాదం చందు కరంబు క్రిందగుట మీద నా కరం బౌటమే కరం భూమి
రాజ్యము దీర్ఘ్యమున్ సతతమే కాయంబు నా పాయమే (లేదా)

ఉత్ప్రేక్ష అలంకారమును సోదాహరణంగా వివరించండి

P. B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE: VIJAYAWADA-10.

An autonomous college under the jurisdiction of Krishna University, A.P., India

COMPUTER SCIENCE	DSCP21A	**2020 - 2021**	**B.Sc. (MSDS)**

Semester: II

Credits: 1

Data Structures using Python Lab

Course Outcomes: The course should enable the students to:

CO1: Understand various data representation techniques in the real world. (PO1, PSO2)

CO2: Implement linear and non-linear data structures. (PSO2)

CO3: **Analyze** various algorithms based on their time and space complexity. (PSO2)

CO4: Develop real-time applications using suitable data structure. (PO11, PSO2)

CO5: Identify suitable data structure to solve various computing problems (PO11, PSO2)

LIST OF EXPERIMENTS

Cycle-I

WEEK-1 SEARCHING TECHNIQUES

Write Python programs for implementing the following searching techniques.

a. Linear search

b. Binary search

WEEK-2 SORTING TECHNIQUES

Write Python programs for implementing the following sorting techniques to arrange a list of integers in ascending order.

a. Bubble sort

b. Insertion sort

WEEK-3 SORTING TECHNIQUES

c. Selection sort

WEEK-4 SORTING TECHNIQUES

Write Python programs for implementing the following sorting technique to arrange a list of integers in ascending order.

a. Quick sort

WEEK-5 SORTING TECHNIQUES

a. Merge sort

WEEK-6 IMPLEMENTATION OF STACK AND QUEUE

Write Python programs to implement Stack and its operations using List.

WEEK-7 IMPLEMENTATION OF STACK AND QUEUE

a. Write Python program to implement Queue and its operations using List.

WEEK-8 APPLICATIONS OF STACK

Write Python programs for the following:

a. Uses Stack operations to convert infix expression into postfix expression.

Cycle-II

WEEK-9 IMPLEMENTATION OF UNORDERED SINGLE LINKED LIST

a. Write Python programs for the following operations on Single Linked List.

(i) Creation (ii) insertion (iii) deletion (iv) traversal

WEEK-10 IMPLEMENTATION OF ORDERED SINGLE LINKED LIST

Write Python programs for the following operations on Circular Linked List.

(i) Creation (ii) insertion (iii) deletion (iv) traversal

WEEK-11 IMPLEMENTATION OF DOUBLE LINKED LIST

Write Python programs for the following:

Uses functions to perform the following operations on Double Linked List.

(i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways

WEEK-12 GRAPH TRAVERSAL TECHNIQUES

Write Python programs to implement the following graph traversal algorithms:

Depth first search.

WEEK-13 GRAPH TRAVERSAL TECHNIQUES

Write Python programs to implement the following graph traversal algorithms:

Breadth first search.

WEEK-14 & 15 IMPLEMENTATION OF BINARY SEARCH TREE

Write a Python program to perform the following:

a. Create a binary search tree.

b. Traverse the above binary search tree recursively in pre-order, post-order and in-order.

c. Count the number of nodes in the binary search tree.

d. Search for the given element in the binary search tree.

e. Find minimum

f. Find maximum

LIST OF REFERENCE BOOKS:

1. Y Daniel Liang, “Introduction to Programming using Python”, Pearson.
2. Benjamin Baka, David Julian, “Python Data Structures and Algorithms”, Packt Publishers,2017.
3. Rance D. Necaise, “Data Structures and Algorithms using Python”, Wiley Student Edition.
4. Martin Jones, “Python for Complete Beginners”, 2015.
5. Zed A. Shaw, “Learn Python the Hard Way: a very simple introduction to the terrifyingly beautiful world of computers and code”, 3e, Addison-Wesley, 2014.
6. Hemant Jain, “Problem Solving in Data Structures and Algorithms using Python: programming interview guide”, 2016.

WEB REFERENCES:

1. https://docs.python.org/3/tutorial/datastructures.html
2. http://interactivepython.org/runestone/static/pythonds/index.html
3. http://www.tutorialspoint.com/data_structures_algorithms

4. http://www.geeksforgeeks.org/data-structures/
5. http://www.studytonight.com/data-structures/
6. http://www.coursera.org/specializations/data-structures-algorithms

P.B. Siddhartha College of Arts & Science, Vijayawada-10
(An Autonomous College under the jurisdiction of Krishna University)
Reaccredited at the level 'A^{+}' by the NAAC
College with Potential for Excellence
(Awarded by UGC)
Course Structure and Syllabi under CBCS

Sl No.	Semester	Course Code	Name Of the Subject	Teaching Hours	Credits
1	**II Semester**	**ENGT25**	**Business English-II**	4	3

OBJECTIVE: The main objective of this course is not only to facilitate the learners to acquire the linguistic competence with a focus on business contexts and environments but also to help them practice and enrich their communication skills by using English in specific business settings and situations and develop their intellectual, personal and professional abilities.

COURSE OUTCOMES:

At the end of the course, the learners will be able to:

CO 1. Develop the skills of writing an effective sales letter by providing detailed guidance on how to arrest the potential buyer's attention and to induce in him an irresistible desire to buy the product. ***PO2***

CO2. Acquaint the learner how credit is requested, how it is accepted and when it is rejected and also to make him aware of the procedure for collecting the credit. ***PO3***

CO3. Describe the characteristic features of reports written in professional contexts and to impress upon the learner the need for acquiring the skill of report writing. ***PO4***

CO4. Describe the various elements of the structure of a report and to provide detailed guidance on how to write them. ***PO1***

CO5. Acquaint the learner with some widely used words which appear to be similar but are semantically different and also help them to realize the importance of punctuation and understand the significance of capitalization in writing. ***PO1***

CO-PO MATRIX- ENG T25							
CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2			M				
CO3						H	
CO4	H						
CO5	H						

P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE, VIJAYAWADA-10.

DEPARTMENT OF ENGLISH

Course Code: ENGT25 **Max Marks: 75**
Title: Business English-II **Time: 3 hours**
SEMESTER II (2019-20) **No. of Credits: 3**

BUSINESS ENGLISH SYLABUS FOR BBA, BBA BA, B.COM AF, B.COM TPP , B.SC MSDS,BPM,CSCS

SYLLABUS

UNIT – I SALES AND CIRCULAR LETTERS page no: 142 to 154

- Communication Core
- Writing a Sales Letter
- Circular Letters
- Review Questions
- Exercises

UNIT – II CREDIT AND COLLECTION LETTERS page no: 163 to 171

- Communication Core
- Nature of a Credit Letter
- Types of Credit Letters
- Collection Procedure
- Distinctive Features of Business Letters
- Review Questions
- Exercises

UNIT – III BUSINESS AND TECHNICAL REPORTS page no: 211 to 221

- Communication Core
- Characteristics
- Importance
- Types
- Routine Reports
- Review Questions
- Exercises

UNIT – IV STRUCTURE AND LAYOUT OF REPORTS page no: 222 to 236

- Communication Core
- Elements of Structure
- Front Matter
- Main Body
- Back Matter
- Review Questions
- Exercises

UNIT – V PLANNING AND PREPARATION page no: 237 to 243

- Preparatory Steps
- Words Often Confused
- Punctuation and Capitalization
-

Reference book: BUSINESS CORRESPONDENCE AND REPORTING **5 TH EDITION** –RC .SHARMA.KRISHNAMOHAN.

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE :: VIJAYAWADA-520 010.
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SEMESTER–II **Credits – 3**

TITLE OF THE PAPER: HINDI–II **COURSE CODE:HINT21**

HINDI -II **2020-2021**

COURSE NAME	COURSE OUTCOMES	COURSE OUTCOMES	PO'S
HINT21	CO1	भारतीय संस्कृति ,भारत सभ्यता ,भारतीय इतिहास व नारी का समाज में महत्व, पर्यावरण की आवश्यकता	PO4
	CO2	समाज में व्याप्त कुरीतियों से विद्यार्थियों का परिचय	PO4
	CO3	पत्र लेखन में पारिवारिक एवं व्यापारिक पत्रों की जानकारी	PO6
	CO4	भाषा परिज्ञान की वृद्धि	PO1
	CO5	तकनीकि शब्दावली से सरकारी कार्यालयों में प्रयुक्त शब्दों की जानकारी	PO7

CO-PO MATRIX

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				M			
CO2				L			
CO3						L	
C04	H						
CO5							M

I. गद्य संदेश :

1. संस्कृति और साहित्य का परस्पर संबंध - डॉ. जी. सुन्दर रेड्डी
2. आम फिर बौरा गये - आचार्य हजारी प्रसाद द्विवेदी
3. भारत एक है - रामधारी सिंह दिनकर

II. कथा लोक :

1. जरिया - चित्रा मुद्गल
2. भूख हडताल - श्री बालशौरि रेड्डी
3. परमात्मा का कुत्ता - मोहन राकेश

III. व्याकरण :

1. कारक
2. संधि क्विच्छेद
3. वर्तनी दोष

IV. कार्यालय हिन्दी

1. अंग्रेजी से हिन्दी
2. हिन्दी से अंग्रेजी

V. पत्र लेखन :

1. पुस्तकों का आर्डर देते हुए पत्र
2. छुट्टी माँगने के पत्र
3. भाई के नाम पर - हिन्दी सीखने की आवश्यकता पत्र
4. नौकरी केलिए आवेदन पत्र

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SEMESTER–II **Credits – 3**

TITLE OF THE PAPER: HINDI–II **COURSE CODE:HINT2I**

No. of Pages: 2	**Roll No.:**	**Max. Marks: 75M**
Time: 3 Hrs.	**No. of Questions: 08**	**Pass Min. : 30M**

1. *निम्न लिखित प्रसंगों में से किन्ही दो की सप्रसंग व्याख्या कीजिए :-* 2 X 8 = 16M L3

अ. मानव कल्याण केलिए पुरुषार्थ पर जितना जोर यहाँ के साहित्य में दिया गया था - उतना अन्य किसी साहित्य में हमें दृष्टिगोचर नहीं होता ।

आ. उन दिनों भारतीय लोगों का हृदय अधिक संवेदनशील था । आज हमारा संवेदन थोथा हो गया है । पुरानी बातों पढ़ने से ऐसा मालूम होता है जैसे कोई अद्यभूला पुराना सपना है ।

इ. कहते हैं पहले पहल अगस्त्य ऋषि ने विंध्याचल को पार करके दक्षिण के लोगों को अपना संदेश सुनाया था ।

2. *किसी एक गद्यांश का विवेचन कीजिए ।* 14M L1

अ. भारत एक है आ. संस्कृति और साहित्य का परस्पर संबंध

3. *किसी एक कहानी का सारांश लिखकर उसकी विशेषताएँ बताइए:-* 10M L1

अ. जरिया आ. परमात्मा का कुत्ता

4. *किन्हीं पाँच कारक जोड कीजिए:-* 5 X 1 = 5M L3

1. राम ——— पत्र लिखा ।
2. रमेश कलम —— लिखता है ।
3. मेज —— किताब है ।
4. राम —— पत्नी सीता है ।
5. कृष्ण ने कंस —— मारा ।
6. ये रमेश —— बच्चे हैं ।
7. यह सुनील —— घर है ।
8. जंगल — पशु-पक्षी रहते हैं ।

5. *किन्हीं पाँच शब्दों का संधि-विच्छेद कीजिए :-* 5 X 1 = 5M L3

1. विद्यालय	2. पित्राज्ञा	3. नयन	4. एकैक
5. स्वागत	6. इत्यादि	7. तपोवन	8. सदैव

6. *किन्ही पाँच शब्दों का वर्तनी दोष लिखिए :-* 5 X 1 = 5M L3

1. पाठशला	2. कविइत्री	3. बोजन	4. लढ़का
5. बाषा	6. अधयापक	7. छात्र	8. हीन्दी

7. *अ) निम्न लिखित में से किन्हीं पाँच अंग्रेजी शब्दों को हिन्दी में रूपांतर कीजिए:-* 5 X 1 = 5M L1

1. Agriculture	2. Botany
3. Code	4. Dairy
5. Training	6. System
7. Normal	8. Gland

आ) निम्न लिखित में से किन्हीं पाँच हिन्दी शब्दों को अंग्रेजी में

रूपांतर कीजिए:- 5 X 1 = 5M L1

1. मनो विज्ञान
2. रक्त वर्ग
3. कवच
4. विषम
5. प्राणि विज्ञान
6. तापमान
7. रसायन
8. ऊष्मा

8. किसी एक पत्र लिकिए :- 10M L3

1. चार दिन की छुट्टी माँगते हुए अपने प्रधानाचार्य के नाम एक पत्र लिखिए ।
2. हिन्दी सीखने की आवश्यकता पर अपने भाई के नाम पर पत्र लिखिए ।

Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
II	MATT44	CORE	ABSTRACT ALGEBRA	100	25	75	6	5

Course Outcomes of MATT44

S. No	C.O	
	Upon successful completion of this course, students should have the knowledge and skills to:	
1	Understand concepts of groups and its properties.	
2	Determine subgroups and whether the given subsets of a group are subgroups.	
3	Explain the significance of cosets, normal subgroups and factor groups.	
4	Determine group homomorphisms and isomorphisms.	
5	Find cycles of a given permutations and understand the properties of cyclic groups.	

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1					**H**		
CO2					**H**		
CO3						**M**	
CO4							**M**
CO5							**M**

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE:VIJAYAWADA-10

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MATHEMATICS	MAT T26	2019 – 20 onwards	B.Sc(MSDS)

ABSTRACT ALGEBRA

SEMESTER-II **No of Credits: 5**

OBJECTIVES:
1. This course aims to provide a first approach to the subject of algebra, which is one of the basic pillars of modern mathematics.
2. The focus of the course will be the study of certain structures called groups, Sub groups, cyclic groups, permutation groups etc..
3. Abstract algebra gives to student a good mathematical maturity and enables to build Mathematical thinking and skill.

UNIT-I : GROUPS **(16 hrs)**

1.1 Binary Operation, Semi group, Algebraic Structure, Monoid, Cancellation laws, Group definition, Abelian group, Elementary Properties

1.2 Finite and Infinite groups with examples, Order of a group with examples

1.3 Addition modulo m – Definition – theorem – Problems

1.4 Multiplication Modulo P – definition- {1, 2, 3,…….p-1} where P is a prime number is a group – theorem – Problems

1.5 Order of an element of a group – Definition – Theorems.

UNIT-II: SUB GROUPS **(20 hrs)**

2.1 Complex definition, Multiplication of two complexes, Inverse of a complex, subgroup definition, Identity and Inverse of a subgroup

2.2 Criterion for a complex to be a subgroup, Criterion for the product of two subgroups to be a subgroup

2.3 Union and Intersection of subgroups.
2.4 Cosets Definition – Properties of cosets.
2.5 Index of a subgroups of a finite groups, Lagrange's Theorem.

UNIT-III: NORMAL SUBGROUPS (18 hrs)

3.1 Definition of a normal subgroup, Proper and improper normal subgroups
3.2 Intersection of two normal subgroups, Subgroup of index 2 is a normal subgroup, Simple group
3.3 Quotient group, Criteria for the existence of a Quotient group

UNIT-IV: HOMOMORPHISM (16 hrs)

4.1 Definition of a Homomorphism, Image of a Homomorphism, Properties of a Homomorphism
4.2 Isomorphism, Automorphism definitions and elementary properties
4.3 Kernel of a homomorphism, Fundamental theorem on homomorphism of groups and Applications
4.4 Inner automorphism, Outer automorphism.

UNIT-V: PERMUTATIONS AND CYCLIC GROUPS (20 hrs)

5.1 Definition of a permutation group, Equal permutations, Permutation multiplications, Order of a permutation, Inverse of a permutation, Orbits and cycles of permutation
5.2 Transposition, Even and odd permutations – Theorem – Related Problems.
5.3 Cayley's theorem – Related Problems.
5.4 Definition of a cyclic group – Properties of Cyclic group
5.5 Standard theorems on cyclic groups – related problems.

Prescribed Text book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V.Venkateswara Rao, BVSS Sharma, S.AnjaneyaSastry & Others	A textbook of mathematics for B.A/B.ScVol – I	S-Chand	2015

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of	Deepthi Publications	2015

		mathematics for B.A/B.ScVol – I		
2	M.L.Khanna	Modern Algebra	Jaya Prakashnadh & Co	2012

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SEMESTER – II
Model Paper

COURSE CODE: MATT 26

TITLE OF THE PAPER: ABSTRACT ALGEBRA

Time: 3hrs. **Max. Marks: 75**

Section – A

Answer any FIVE questions **5x5=25**

1. In a group G, Show that the inverse of an element is unique. (L1,CO1)
2. H is a non-empty complex of a group G. Show that the necessary and sufficient condition for H to be a sub group of G is $a,b \in H \Rightarrow ab^{-1} \in H$. (L1,CO2)
3. Show that any two left (right) cosets of a sub group are either disjoint (or) identical.(L2,CO3)
4. Show that every subgroup of an abelian group is normal. (L3,CO3)
5. Prove that Every Quotient group of an abelian group is abelian. (L2,CO3)
6. If 'f' is a homomorphism of a group G into a group G', then show that the Kernel of f is a normal subgroup of G. (L3,CO3)
7. Use Cayley's theorem to find the regular permutation group isomorphic to the multiplicative group $\{1,-1, i,-i\}$. (L3,CO5)
8. Prove that every cyclic group is abelian. (L2,CO5)

Section – B

Answer ALL questions. **(5 x 10 = 50)**

Unit - I

9.(a). Prove that the set Z of all integers from an abelian group w.r.t to the operation defined by a * b = a+b+2 $\forall$ a,b $\in$ z. (L3, CO1)

(OR)

(b).Prove that G = {0,1,2,3,4,5} is an abelian group w.r.t. addition modulo 6.(L3,CO1)

Unit – II

10.(a).Prove that the union of two sub groups of a group G is a sub group of G if and only if one is contained in the other. (L1,CO2)

(OR)

(b).State and prove Lagrange's theorem on groups. (L1,CO2)

Unit – III

11.(a).If H is a normal subgroup of a group G, then prove that the set of all cosets of H in G is a group with respect to coset multiplication. (L1,CO3)

(OR)

(b).Prove that H is a normal subgroup of a group G iff product of two right cosets of H is again a right coset of H. (L1, CO3)

Unit – IV

12.(a).State and Prove Fundamental Theorem of Homomorphism. (L1,CO4)

(OR)

(b).Let 'a' be a fixed element of a group G. Prove that the mapping $f_a : G \to G$ defined by $f_a(x) = a^{-1}xa \forall x \in G$ is an auto morphism of G. (L2, CO4)

Unit - V

13.(a).Prove that every finite group G is isomorphic to a permutation group. (L1,CO5)

(OR)

(b).Prove that every subgroup of a cyclic group is cyclic. (L1,CO5)

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STATISTICS	STAP21A	2019 – 20 Onwards	B.A(EMS)/ B.Sc.(MSCs,MSDs&CAMS)

SEMESTER-I **Practical - II** **No of Credits: 1**

Discrete Probability Distributions

Upon successful completion of this course, students should have the knowledge and skills to:

Title of the course :Discrete Probability Distributions

	Course: STAP21A Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	Apply the binomial distribution to find expected frequencies	PO5
CO 2	Apply the Poisson distribution to find expected frequencies	PO5
CO3	Apply the Negative binomial distribution to find expected frequencies	PO5
CO 4	Apply the Geometric distribution to find expected frequencies	`PO5
CO 5	Apply the Geometric distribution to find expected frequencies using recurrence relation.	PO5

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAP21A	**CO1**					**M**		
	CO2					**H**		
	CO3					**H**		
	CO4					**H**		
	CO5					**M**		

1. Fitting of Binomial Distribution (Direct Method) and computation of expected frequencies
2. Fitting of Binomial Distribution (Recurrence Method) and computation of expected frequencies
3. Fitting of Poisson Distribution (Direct Method) and computation of expected frequencies
4. Fitting of Poisson Distribution (Recurrence Method) and computation of expected frequencies
5. Fitting of Negative Binomial Distribution (Direct Method) and computation of expected frequencies
6. Fitting of Negative Binomial Distribution (Recurrence Method) and computation of expected frequencies
7. Fitting of Geometric Distribution (Direct Method) and computation of expected frequencies
8. Fitting of Geometric Distribution (Recurrence Method) and computation of expected frequencies.

Structure of Practical Paper-VI
External Examination for 50 Marks

(i) For Continuous Evaluation	**–**	**10 marks**
(ii) For semester end practical Examination	**–**	**40 marks**

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SEMESTER - II **PAPER – II** **No. of credits :4**

STATISTICS	**STAT21A**	**2019 – 20 Onwards**	**B.A(E.M.S)/B.Sc.(M.S.Cs, M.S.Ds & Ca.M.S)**

Course outcomes

Title of the course :Random Variable And Discrete Probability Distributions		
Course Outcome	**Course: STAT21A** Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	Knowledge related to concept of discrete and continous random variables	PO5
CO 2	Knowledge related to concept of expectation and moments	PO5
CO3	Knowledge related to concept of generating functions	PO5
CO 4	Knowledge of important discrete distributions such as binomial, Poisson, Negative binomial, Geometric and Hyper- Geometric distributions	`PO5
CO 5	Acumen to apply standard discrete probability distributions to different situations	PO5

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAT21A	**CO1**					**L**		
	CO2					**M**		
	CO3					**H**		
	CO4					**H**		
	CO5					**H**		

Random variable and Discrete Probability Distributions

Random Variable: Concept of discrete random variable, probability mass function and distribution function, joint probability mass function of two discrete random variables, marginal and conditional probability mass functions. Concept of continous random variable, probability density function and distribution function, joint probability density function of two continous random variables, marginal and conditional probability density functions. One functions of random variable. **10 L + 2 T = 12**

Expectation of discrete random variables and its properties, conditional expectation, moments in terms of expectation, moment generating function (m.g.f) , cumulant generating function(c.g.f), characteristic function (c.f.) and probability generating function (p.g.f), Properties of m.g.f. , c.g.f. , c.f and p.g.f. , Coefficients of skewness and kurtosis based on moments, Cauchy-Schwartz Inequality. **10 L + 2 T = 12**

Expectation of continuous random variables and its properties, conditional expectation, moments in terms of expectation, moment generating function (m.g.f) , cumulant generating function(c.g.f) and characteristic function (c.f.) Properties of m.g.f. , c.g.f. and c.f., Coefficients of skewness and kurtosis based on moments, Chebychev's Inequality. **10 L + 2 T = 12**

Standard Discrete Probability Distributions - I

Evaluation of p.m.f., c.d.f. non-central and Central moments , moment generating function, Cumulant generating function, Probability generating function, Characteristic function, Recurrence relation for the central moments, Mode, Additive property, Recurrence relation for the probabilities, of the following distributions: Uniform distribution, Bernoulli distribution , binomial distribution and Poisson distribution. **10 L + 2 T = 12**

Standard Discrete Probability Distributions -II

Evaluation of p.m.f., c.d.f., mean , variance , moment generating function, Cumulant generating function, probability generating function, characteristic function, Recurrence relation for the central moments, additive property of the following distributions: Geometric distribution, Negative binomial distribution and Hypergeometric distribution. **10 L + 2 T = 12**

Text Book:

Fundamentals of Mathematical Statistics, 11th Edition, 2010, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi

List of Reference Books:

1. B.A/B.Sc. First Year Statistics(2010) , Telugu Akademi, Hyderabad.
2. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and Chris P.Tsokos Academic Press(Elsevier), Haryana .
3. Probability and Statistics,Volume I, D.Biswas, New central book Agency (P) Ltd, New Delhi.
4. An outline of Statistical theory, Volume two,3rd Edition,2010(with corrections) A.M.Goon,M.K. Gupta, B.Dasgupta ,The World Press Pvt.Ltd., Kolakota.
5. Sanjay Arora and BansiLal:. New Mathematical Statistics, SatyaPrakashan , New Delhi.
6. Mathematical Statistics, 3rd edition, 2009, ParimalMukhopadhyay, Books & Allied(p) Ltd, Kolkata.

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STATISTICS	**STAT21A**	**2019 – 20 Onwards**	**B.A(EMS) / B.Sc.(MSCs,MSDs& CAMS)**

Random variables and Discrete Probability Distributions

Model Paper

Section – A

Answer any FIVE of the following **5 x 5M = 25M**

(1) Explain the concept of random variables and types of random variables. (L2,CO1)

(2) Define variance and write its properties. (L1,CO2)

(3) Define moment generating function and write its properties. (L1,CO3)

(4) Define characteristic function and its properties. (L1,CO3)

(5) Show that in Poisson distribution mean and variance are equal. (L3,CO4)

(6) Define negative binomial distribution and find its mean. (L1,CO4)

(7) Obtain mean and variance of hyper geometric distribution. (L1,CO4)

(8) In Binomial distribution mean and variance are 4 and 3 respectively. Find mode of the distribution. (L3,CO5)

Section – B

Answer the following **5 x 10M =50M**

(9) a) The joint p.d.f of X and y is given by $f(x,y) = e^{-(x+y)}$, x≥0, y≥0. Find

(i) joint distribution function F(x,y) (L3,CO1)

(ii) Marginal density functions of x and y. (L3,CO1)

(OR)

b) A random variable X has the following probability distribution

$X = x$	-2	-1	0	1	2	3
$P(X = x)$	0.1	k	0.2	2k	0.3	3k

(i) Find the value of k

(ii) Evaluate $P(X < 2), P(X \geq 2), P(-2 < X < 2)$

(iii) Calculate mean and variance. (L3,CO1)

(10) a) State and prove addition and multiplication theorems of expectations. (L5,CO- 2)

(OR)

b) State and prove Cauchy –Schwarz Inequality and also prove that Mean deviation is less than standard deviation. (L5,CO-2)

(11) a) Two random variables X and Y have the following joint pdf

$$f(x,y) = K(4 - x - y); 0 \leq x \leq 2, 0 \leq y \leq 2.$$

Find the value of k, E(x) , E(Y) , V(X) and V(Y). (L5,CO- 2)

(OR)

b) State and prove Chebychev's Inequality. (L5,CO-2)

(12) a) (i) Derive the recurrence relation for central moments of binomial distribution. (L3, CO4)

(ii) A book contains 43 mistakes in 585 pages. Find the probability that there will be no mistake in randomly selected 10pages of the book. (L3, CO5)

OR

(b) (i) If a Poisson distribution such that 3P(x=1) = 2P(x=3). Find $P(2 \leq X \leq 5)$ (L3,CO5)

(ii) Obtain mode of the Poisson distribution. (L3,CO4)

(13) (a) State and prove lack of memory property of geometric distribution (L5, CO4)

(OR)

(b) Show that Hyper geometric distribution tends to Binomial distribution (L5,CO4)

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Course Code : TEL T21

COURSE NAME	COURSE OUT COMES NO	COURSE OUT COMES	PO NO.
B.A, BBA, BBA (BA) B.COM (GEN), B.COM (CA) B.SC (MPCS), B.SC(BZC), B.SC(MECS) B.SC(MSCA)	CO 1	గతంలో జరిగిన గుణదోషాలు గ్రహించి సజ్జన మైత్రి బంధాన్ని అలవర్చుకొని ప్రవర్తించగలరు	5
	CO 2	నూతన పోకడలను అర్థంచేసుకొని ఇంకా ఎదుగుదలకు తోడ్పడండి మనుషులంతా ఒకటే అనే సదుద్దేశంతో ముందుకు సాగ గలదు	4
	CO 3	తేలికైన మాటల రూపంలో గ్రహించిన విషయాలని తనతోజీవిస్తున్న సమాజానికి ఉపయోగించి ఉత్తమ పౌరులుగా ప్రవర్తనకు దారితీస్తుంది	3
	CO 4	వృత్తులు మనిషిఅభ్యున్నతికి మాత్రమేనని గ్రహించి వాని ద్వారా భవిష్యత్ తరాలు సక్రమ పద్ధతిలో ప్రయాణించటానికి అవకాశం కల్పించేది	7
	CO 5	నేర్చిన విషయజ్ఞానం మన మస్తిష్కంలోఎంతవరకు నిక్షిప్తమై ఉందనే విషయాలు గుర్తు చేసేందుకు ఉపయోగకరం	6

CO PO MATRIX

Course Code : TEL T21

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1					H		
CO2				M			
CO3			M				
CO4							H
CO5						H	

Telugu	TELT21	2019-20	B.A,B.Sc,,B.Com,B.Com Computers, Appilications, B.Com E-commerce,BBA,BBABA,B.Com TPP,BCA

Semester -II SYLLABUS Credits: 3

అభ్యసన ఫలితాలు :

CO 1 : గతంలో జరిగిన గుణదోషాలు గ్రహించి సజ్జన మైత్రి బంధాన్ని అలవర్చుకొని ప్రవర్తించగలరు

CO 2 : నూతన పోకడలను అర్థం చేసుకొని ఇంకా ఎదుగుదలకు తోడ్పడండి మనుషులంతా ఒకటే అనే సదుద్దేశంతో ముందుకు సాగ గలదు

CO 3 : తేలికైన మాటల రూపంలో గ్రహించిన విషయాలని తనతో జీవిస్తున్న సమాజానికి ఉపయోగించి ఉత్తమ పౌరులుగా ప్రవర్తనకు దారితీస్తుంది

CO 4 : వృత్తులు మనిషి అభ్యున్నతికి మాత్రమేనని గ్రహించి వాని ద్వారా భవిష్యత్ తరాలు సక్రమ పద్ధతిలో ప్రయాణించటానికి అవకాశం కల్పించేది

CO 5 : నేర్చిన విషయ జ్ఞానం మన మస్తిష్కంలో ఎంతవరకు నిక్షిప్తమై ఉందనే విషయాలు గుర్తు చేసేందుకు ఉపయోగకరం

ప్రాచీన కవిత్వం

1.మను చరిత్ర - అలసాని పెద్దన

(మను చరిత్ర ద్వితీయాస్వాసం 31 వ పద్యం నుండి 68వ పద్యం)

2.సుభద్ర పరిణయం - చేమకూర వెంకట కవి

(విజయ విజయ విలాసం తృతీయాస్వాసం 93వ పద్యం నుండి 139 వ పద్యం)

ఆధునిక కవిత్వం

1.ముసాఫర్లు - జాషువా

2.మేఘ దూతం - పుట్టపర్తి నారాయణాచార్యులు

కథానికలు

1.కులవృత్తి - కొలకలూరి ఇనాక్

2. మార్పు వెనుక మనిషి -శీలా సుభద్రాదేవి

ఉపవాచకం (నవల)

బతుకాట - డాక్టర్ .వి. ఆర్ .రాసాని

Parvathaneni Brahmayya Siddhartha College of Arts and Science Vijayawada 520010
An autonomous college in the Jurisdiction of Krishna University. Machilipatnam)

Telugu	TELT21	2019-20	B.A,B.Sc,,B.Com,B.Com Computers, Appilications, B.Com E-commerce,BBA,BBABA,B.Com TPP,BCA

Semester -II MODEL PAPER Credits: 3

1. మన చరిత్ర పాఠ్యం ఆధారంగా ప్రవరుని గుణగణాలను వివరించండి (లేదా) 15M

   సుభద్ర పరిణయం లోని తెలుగు వాళ్ళ సంస్కృతి సంప్రదాయాలను వివరించండి

2. జాషువా కవి ముస్తఫాలు పాఠ్యాంశం ద్వారా అందించిన సందేశాన్ని తెలపండి (లేదా) 15M

   మేఘదూతము పాఠ్యాంశంలో పుట్టపర్తి వారు వర్ణించిన ఆంధ్రుల వైభవాన్ని తెలపండి

3. క్రింది వానిలో రెండింటికి సందర్భ సైత వ్యాఖ్యలు రాయండి 2X5 =10M

   1. పారవైచితే మిన్నులు పడ్డచోట

   2. మోదమున నేగి కళ్యాణ వేదికడకు

   3.పారకున్న నీరు నీరు పాచి పట్టు

   4.శాస్త్రపుల రక్తం బెడవి సెలయేరుగా

4. కులవృత్తి కథ ద్వారా దళితుల జీవనాన్ని వివరించండి (లేదా) 10M

   మార్పు వెనుక మనిషి కథలో రచయిత్రి తెలిపిన సందేశాన్ని తెలపండి

5.ఈ క్రింది వానిలో మూడింటికి సమాధానం రాయండి 3X5 =15M

   1.వరూధిని ప్రవరాఖ్యుల సంభాషణను గురించి రాయండి

   2. .ముసాఫర్లు పాఠ్య భాగంలో మానవత్వ ప్రబోధం

   3. కులవృత్తి కథలోని సందేశాన్ని సందేశమును తెలపండి

   4. మార్పు వెనుక మనిషి కథలో విచిత్రమైన పల్లె జీవనమును తెలపండి

   5. బతుకాట నవల లోని గజ్జ పూజను వర్ణించండి

   6.బతుకాట నవల లోనిసిద్దోజి పాత్ర చిత్రణ

6. బతుకాట నవల లోని కళాకారుల జీవనాన్ని చిత్రించింది (లేదా) 15M

   బతుకాట నవల ద్వారా రాసాని వారు చెప్పదలచిన ముఖ్యాంశాలను రాయండి

Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
I	MATT11A	CORE	DIFFERENTIAL EQUATIONS	100	25	75	6	5

Programme Outcomes

S. No	P.O
	At the end of the Programme the student will be able to:
PO5	**Critical Thinking:**Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degrees to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual ,organizational and personal) from different perspectives
PO6	**Specified skills/ transferable skills:**Demonstrate subject-related and transferable skills that are relevant to some of the job trades and employment opportunities.
PO7	**Self-directed and Life –long learning**: Acquire the ability to engage in independent and life long learning in the broadest context socio-technological changes.

Course Outcomes of MATT11A

S. No	C.O	
	Upon successful completion of this course, students should have the knowledge and skills to:	
CO1	Determine the solution of differential equations of the first order and of the first degree by Exact, Linear and Bernoulli's method.	
CO2	Understand the basic concepts of first order differential equations to find Orthogonal trajectories.	
CO3	Determine the solution of differential equations of the first order and of a degree higher than first by using methods of solvable for P, X, and Y.	
CO4	Compute all solutions of second and higher order linear differential equations with constant coefficients, linear	

	equations with variable coefficients.	
CO5	Calculate the solutions of higher order differential equations by Cauchy Euler and Variation of parameters.	

CO-PO MATRIX							
CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1					**H**		
CO2					**H**		
CO3						**M**	
CO4							**M**
CO5							**M**

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE

VIJAYAWADA-10.

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	**MAT T11A**	**2020 – 21 onwards**	**B.A,B.Sc(MPC,MPCS,MECS,CAMS, MSCS,CAME,MSDS)**

DIFFERENTIAL EQUATIONS

SEMESTER-I **No of Credits: 5**

OBJECTIVES:

1.Understand all of the concepts relating to the order and linearity of ODEs, analytic and computational solution methods for ODEs, and the real-world applications of ODEs.

2. Apply your understanding of the concepts, formulas, and problem-solving procedures to thoroughly investigate relevant physical models.
3. Explain the concepts of linear systems, ODE solution methods, and related ideas at a fundamental level, as well as how and why we use the solution techniques that we use.

UNIT-I: DIFFERENTIAL EQUATIONS OF FIRST ORDER& FIRST DEGREE

(12Hrs)

1.1 Linear Differential Equations

1.2 Differential Equations Reducible to Linear Form, Bernoulli's differential equations.

1.3 Exact Differential Equations

1.4 Integrating Factors, 1/Mx+Ny, 1/Mx-Ny, $e^{\int f(x)dx}$, $e^{\int g(y)dy}$, *and Inspection method*

1.5 Change of Variables

UNIT-II: ORTHOGONAL TRAJECTORIES &DIFFERENTIAL EQUATIONS OF FIRST ORDER BUT NOT FIRST DEGREE

(12Hrs)

2.1 Orthogonal Trajectories

2.2 Self Orthogonal Trajectories

2.3 Equations solvable for p

2.4 Equations solvable for y

2.5 Equations solvable for x

2.6 Equations Homogeneous in X & Y

2.7 Equations that do not contain x (or y)

2.8 Clairaut's Equation and Equations reducible to clairaut's form.

UNIT – III: Higher order linear differential equations-I (12Hrs)

3.1Solution of homogeneous linear differential equations of order n with constant coefficients

3.2 Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.

3.3 General Solution of f(D)y=0

3.4 General Solution of f(D)y=Q when Q is a function of x.

3.5 $\frac{1}{f(D)}$ is Expressed as partial fractions.

3.6 P.I. of f (D) y = Q when Q= be^{ax}

3.7 P.I. of f (D) y = Q when Q is b sinax or b cosax.

UNIT – IV: Higher order linear differential equations-II (12Hrs)

4.1Solution of the non-homogeneous linear differential equations with constant coefficients.

4.2 P.I. of f (D) y = Q when Q= bx^k

4.3 P.I. of f (D) y = Q when Q= $e^{ax}V$

4.4P.I. of f (D) y = Q when Q= xV

4.5P.I. of f (D) y = Q when Q= x^mV where v = sin bx and cosbx

UNIT-V: Higher order Differential Equations –III (12Hrs)

5.1 The Cauchy-Euler Equation.

5.2 Linear differential Equations with non-constant coefficients

5.3 Method of Variation of parameters.

Prescribed Text book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V.Krishna Murthy	A text book of mathematics for B.A/B.ScVol – I	S-Chand&co	2015

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF

				PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	2015
2	RaiSinghania	Ordinary& Partial Differential Equations	S-Chand	2009
3	Zafar Ahsan	Differential Equations and their applications	Prentice-Hall of India Pvt Ltd, McGraw Hill	2000

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS &SCIENCE :: VIJAYAWADA-10.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

CBCS/ SEMESTER SYSTEM(W.e.f 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-I, DIFFERENTIAL EQUATIONS

MATHEMATICS MODEL PAPER

Time: 3hrs. Max. Marks: 75

Section – A

Answer any FIVE questions **5x5=25**

1. Determine the solution of $2xy\,dy - (x^2+y^2+1)\,dx = 0$ (CO1,L2)
2. Determine the solution of $x\frac{dy}{dx} + 2y - x^2 \log x = 0$ (CO1,L2)
3. Find the orthogonal trajectories of the family of $r = a(1-\cos\theta)$ where a is a parameter. (CO2, L2)
4. Solve $x = y + p^2$ (CO3,L2)
5. Compute the C.F of $(D^3 + 3D^2 + 3D + 1)y = e^{5x}$ (CO4,L3)
6. Compute the P.I of $(D^3 + 4D)y = \sin 2x$ (CO4,L3)
7. Determine the solution of $d^2y/dx^2 + y = \text{Cosec } x$ by variation of parameters. (CO5,L2)
8. Determine the solution of $\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - (1 - \cot x)y = e^x \sin x$ (CO4, L3)

Section – B

Answer ALL questions. **(5 x 10 = 50 marks)**

Unit – I

9. Determine the solution of x (1 + xy) dy + y (1 - xy) dx = 0 (CO1, L2)

(OR)

10. Determine the solution of $x\frac{dy}{dx} + y = y^2 \log x$ (CO1, L2)

Unit – II

11. Find the orthogonal trajectories of the family of curves $x^{2/3} + y^{2/3} = a^{2/3}$, where 'a' is the parameter. (CO2, L2)

(OR)

12. Determine the solution of $y + px = p^2x^4$ (CO3, L2)

Unit – III

13. Determine the solution of $(D^2 + 4D + 4)y = e^{4x}$ (CO4, L3)

(OR)

14. Determine the solution of $\left(D^2 - 2D + 3\right)y = \cos 2x$ (CO4, L3)

Unit – IV

15. Determine the solution of $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$ (CO4, L3)

(OR)

16. Determine the solution of $(D^4 + 2D^2 + 1)y = x^2 \cos x$ (CO4, L3)

Unit - V

17. Determine the solution of $\left[(x-1)D^2 - xD + 1\right]y = (x-1)^2$ by variation of parameters. (CO5, L2)

(OR)

18. Determine the solution of $(x^2D^3 + 2x^3D^2 - x^2D^2 + x)y = 1$ (CO5, L2)

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE VIJAYAWADA - 520 010

An autonomous college in the jurisdiction of Krishna University, A.P., India

COMPUTER SCIENCE	DSCP11A	2020 - 2021	B.Sc. MSDS

Semester: I Credits: 2

Introduction to Python Programming Lab

Course Educational Objective: This Python course leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, sets, working with binary data, and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Installation of Python programming software (PO3, PO7, PSO2)

CO2: Identify various data structures available in Python and apply them in solving computational problems. (PO7, PSO2)

CO3: Design and implement programs to process data. (PO1, PSO2)

CO4: Explore the usage of exception handling and database interaction. (PO11)

CO5: Build functions and packages in python (PO11)

Lab Exercises

I. **Exercise programs on basic control structures & loops**

a. Write a program for checking the given number is even or odd.
b. Using a for loop, write a program that prints the decimal equivalents of 1/2, 1/3, 1/4,...1/10
c. Write a program for displaying reversal of a number.
d. Write a program for finding biggest number among 3 numbers.
e. Write a program using a while loop that asks the user for a number and prints a countdown from that number to zero.

II. Exercise programs on operators & I/O operations.

a. Write a program that takes 2 numbers as command line arguments and prints its sum.
b. Implement python script to read person's age from keyboard and display whether person is eligible for voting or not.
c. Implement python script to check the given year is leap year or not.

III. Exercise programs on Python Script

a. Implement Python Script to generate first N natural numbers.
b. Implement Python Script to check given number is palindrome or not.
c. Implement Python script to print factorial of a number.
d. Implement Python Script to print sum of N natural numbers.
e. Implement Python Script to check given number is Armstrong or not.
f. Implement Python Script to generate prime numbers series up to n.

IV. Exercise programs on Lists

a. Finding the sum and average of given numbers using lists.
b. To display elements of list in reverse order.
c. Finding the minimum and maximum elements in the lists.

V. Exercise programs on Strings

a. Implement Python Script to perform various operations on string using string libraries.
b. Implement Python Script to check given string is palindrome or not.
c. Implement python script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.

VI. Exercise programs on functions.

a. Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.
b. Define a function that checks whether the given number is Armstrong

VII. Exercise programs on recursion & parameter passing techniques.

a. Define a function which generates Fibonacci series up to n numbers.
b. Implement a python script for Call-by-value and Call-by-reference
c. Implement a python script for factorial of number by using recursion.

IX. Exercise programs on Tuples

a. Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number. Suppose the following input is supplied to the program:34,67,55,33,12,98. Then, the output should be: ['34', '67', '55', '33', '12', '98'] ('34',67', '55', '33', '12', '98').

X. Exercise programs on files

a. Write Python script to display file contents.
b. Write Python script to copy file contents from one file to another.

XI. Exercise programs on searching & sorting Techniques.

a. Implement a python script to check the element is in the list or not by using Linear search .
b. Implement a python script to check the element is in the list or not by using Binary search.

XII. Exercise programs on Exception handling concepts

a. Write a python program by using exception handling mechanism.

Text Book:

1. Python programming: A modern approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Book:

1. Think Python, Allen Downey, Green Tea Press

COMPUTER SCIENCE	DSCT11A	2020 - 2021	B.Sc. MSDS

Semester: I Credits: 3

Introduction to Python Programming Total: 60hrs

Course Objectives:

1. To understand why Python is a useful scripting language for developers.
2. Install and run the Python interpreter
3. To acquire programming skills in core Python.
4. Usage of various python objects
5. To acquire Object Oriented Skills in Python.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

COs	Statements	Bloom's Level
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	L2
CO2	Express proficiency in the handling of strings and functions.	L2
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	L3
CO4	Identify the commonly used operations involving file systems and regular expressions.	L2
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	L3

Course Articulation Matrix (CO-PO Mapping)

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	2	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-	1	2	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-	2	3	-
CO4	2	2	1	1	3	-	-	-	-	-	-	-	1	2	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-	2	3	-

UNIT No	Syllabus Content	No. of Hours
1	**Parts of Python Programming Language,** Identifiers, Keywords, Statements and Expressions, Variables. Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements,** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement.	**12hrs**
2	The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, **Functions,** Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables.Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	**12hrs**
3	**Strings,** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	**12hrs**
4	**Dictionaries,** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	**12hrs**
5	**Files,** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression Operations,** Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.	**12hrs**

TEXT BOOK

Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372.

REFERENCE BOOKS / WEBLINKS:

1. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058.
2. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.

P.B.SIDDHARTHA COLLEGE OF ARTS& SCIENCE

Siddharthanagar, Vijayawada — 520010

(An Autonomous College under the jurisdiction of Krishna University)

Re— Accredited at 'A+ by NAAC—III Cycle

College with Potential for Excellence

ISO9001 — 2015 Certlfied

Title of paper : Time: 3Introduction to Python Programming **Course Code : DSCT11A**

Hours Class : I MSDS **Total Marks : 70Marks**

Semester : I

Answer *ALL* the following questions

UNIT - I

1. A) Describe the types of operators used in Python. (10M) (CO1,L1)

OR

B)Describe decision flow control statements with the help of examples. (10M)(CO1,L1)

2. A) Explain data types used in Python.(4M)((CO1,L2)

OR

B) Explain expressions and statements with the help of examples. (4M) (CO1,L2)

UNIT - II

3. A) Define exceptions. Explain the concept with the help of an example program. (10M) (CO2,L1)

OR

B) Define function. Explain built in functions and modules with suitable examples.. (10M) (CO2,L1)

4. A) Explain break and continue statement. (4M) (CO2,L2)

OR

B) Explain command line arguments. (4M) (CO2,L2)

UNIT - III

5. A) Explain basic operations and built-in functions of strings with suitable examples.(10M) (CO3,L2)

OR

B) Explain basic operations and built-in functions of lists with suitable examples.(10M) (CO3,L2)

6. A) Explain about string methods with the help of suitable examples. (4M) (CO3,L2)

OR

B) Explain about list methods with suitable examples. (4M)(CO3,L2)

UNIT – IV

7. A) Describe about built-in functions and methods in dictionaries. (10M) (CO4,L2)

OR

B) Describe various operations involved in tuples with examples. (10M) (CO4,L2)

8. A) Describe dictionary methods. (4M)(CO4,L1)

OR

B) Describe relation between tuples and lists. (4M)(CO4,L1)

UNIT - V

9. A) Explain types of files with the help of examples. (10M) (CO5,L2)

OR

B) Explain regular expression methods with examples. (10M) (CO5,L2)

10. A) Explain about os and os.path modules. (4M) (CO5,L2)

OR

B) Explain regular expressions with the glob module. (4M) (CO5,L2)

***

Parvathaneni Brahmayya Siddhartha College of Arts & Science, Vijayawada-10
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(Awarded by UGC)

Sl No.	Semester	Course Code	Name Of The Subject	Teaching Hours	Credits
1	**I Semester**	**ENGT15**	**Business English-I**	4	3

OBJECTIVE: The main objective of this course is not only to facilitate the learners to acquire the linguistic competence with a focus on business contexts and environments but also to help them practice and enrich their communication skills by using English in specific business settings and situations and develop their intellectual, personal and professional abilities.

COURSE OUTCOMES:

At the end of the course, the learners will be able to:

CO 1. Recognize the basics of Communication, i.e., its process, components and besides types, giving them a clear perception of the nature of business communication, its global, ethical and legal aspects. ***PO1***

CO 2. Establish and maintain interpersonal relationships with agility and transmit message through nonlinguistic signs focus is on both spoken and written form. ***PO3***

CO 3. Identify the basic principles and elements of writing business letters and apply the fundamentals to compose business letters required for business transactions. ***PO7***

CO 4. Produce clear and coherent writing in which the development, order and style are appropriate to task, purpose and addressees. ***PO1***

CO-PO MATRIX- ENG T15							
CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H						
CO2			M				
CO3							H

CO4	M						
CO5	---						

BUSINESS ENGLISH SYLLABUS FOR BBA/ BBA BA/ B.COM AF/B.COM TPP/BPM/MSDS/CSCS/BSFI/AI&ML COURSES UNDER CBCS

SEMESTER-I

COURSE CODE: ENG T15 **Max. Marks: 100**
No. of Hours per Week: 4 **External: 75M**
No. of Credits: 3 **Internal: 25M**

COURSE TITIE- BUSINESS ENGLISH-I

UNIT-I Nature of Communication **P- 3-19 - 12 hours**

- Communication core
- Process of communication
- Types of communication
- Aspects – Global, Ethical and Legal
- Communication in organizations
- Review Questions/Exercises

UNIT-II Non Verbal Communication **P-28-52 - 14 hours**

- Importance-Means
- Kinesics
- Paralinguistics - Proxemics
- Chronemics - Haptics
- Review Questions/Exercises

Barriers of Communication

- Causes- Linguistic, Psychological
- Interpersonal- Cultural - Physical
- Organizational Barriers
- Reviews Questions/Exercises

UNIT-III Principles of Letter Writing **P-93-104 - 10 hours**

- Nature and function of Letters
- Principles / Review Questions/Exercises

UNIT-IV Quotations, orders and tenders **P-125-141 - 12 hours**

- Inviting quotations
- Sending quotations
- Placing orders
- Inviting tenders
- Review Questions/Exercises

UNIT-V Claim and Adjustment Letters **P-155-161 - 12 hours**

- Making claims
- Offering adjustments

Review Questions/Exercises

Business Correspondence and Report Writing , RC Sharma and Krishna mohan

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SEMESTER–I **Credits – 3**

TITLE OF THE PAPER: HINDI–I **COURSE CODE:HINTII**

HINDI-I **2018-2019**

COURSE NAME	COURSE OUTCOMES	COURSE OUTCOMES	PO'S
HINT11	CO1	मानव मूल्यों को पहचानकर समाज कल्याण हेतु देने के लिए तैयार रहना।	PO3
	CO2	आधुनिक युग की भावनाओं को पहचानकर सामाजिक समस्याओं का सामना करते हुए , निरंतर आगे बढना।	PO2
	CO3	विषय का विश्लेषण करके,विषयों को अपना अनुकूल बनाकर समाज में आगे बढने के लिए प्रयास करना।	PO7
	CO4	ग्रहण किये गये पाठ्यांशों द्वारा विध्यार्थियों का ज्ञान मापन किया जाता सकता हैं।	PO1
	CO5	हमारी भाषा का उपयोग हम किस भाषा का प्रयोग करते हैं, उसके द्वारा समाज कल्याण, विद्यार्थियों का उज्वल भविष्य हेतु उपयोगी होना चाहिए।	PO7

CO-PO MATRIX

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			H				
CO2		M					
CO3							H
C04	L						
CO5							H

I. गद्य संदेश :

1. साहित्य की महत्ता - महावीर प्रसाद द्विवेदी
2. सच्ची वीरता- सरदार पूर्णसिंह
3. मित्रता - आचार्य रामचन्द्र शुक्ल

II. कथा-लोक :

1. मुक्तिधन - प्रेमचंद
2. गूदड साई - जयशंकर प्रसाद
3. उसने कहा था - चन्द्रधरशर्मा गुलेरी

III. व्याकरण :

1. लिंग
2. वचन
3. विलोम शब्द

IV. कार्यालय हिन्दी

1. अंग्रेजी से हिन्दी
2. हिन्दी से अंग्रेजी

V. अवकरण

Reference Books:

गद्य संदेश

Hindi Text Book for B.A., B.Com., & B.Sc.
Published by
LORVEN PUBLICATIONS, 3-5-1108, Blood bank Road, Narayanaguda, Hyderabad.

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SEMESTER–I **Credits – 3**

TITLE OF THE PAPER: HINDI–I **COURSE CODE:HINT11**

No. of Pages: 2	**Roll No.:**	**Max. Marks: 75M**
Time: 3 Hrs.	**No. of Questions: 08**	**Pass Min. : 30M**

1. ***निम्न लिखित प्रसंगों में से किन्ही दो की सप्रसंग व्याख्या कीजिए :-*** **2 X 8 = 16M L3**

अ. ज्ञान-राशि के संचित कोष ही का नाम साहित्य है ।

आ. सत्व-गुण के समुद्र में जिन का अन्तः-
करण निमग्न हो गया वे ही महात्मा, साधु और वीर है ।

इ. कुसंग का ज्वर सबसे भयानक होता है ।

2. ***किसी एक गद्यांश का सारांश लिखकर उसकी विशेषताएँ बताइए ।*** **14M L1**

अ. मित्रता आ. सच्ची वीरता

3. ***किसी एक कहानी का सारांश लिखकर उसकी विशेषताएँ बताइए:-*** **10M L1**

अ. गूढडसाई आ. उसने कहा था

4. ***किन्हीं पाँच वाक्यों को लिंग बदलकर वाक्य फिर से लिखिए :-*** **5 X 1 = 5M L3**

1. लडका बाजार जा रहा है ।
2. अध्यापक पाठ पढ़ाते हैं ।
3. पंडित पूजा करता है ।
4. शेर जंगल में दौडता है ।

5. वह एक बडा गायक है ।

6. बच्ची रो रही है ।

7. पिताजी घर जा रहे हैं ।

8. नौकर बाजार से सामान लाता है ।

5. ***किन्हीं पाँच वाक्यों को वचन बदलकर फिर से लिखिए:-*** **5 X 1 = 5M L3**

1. सभा में विद्वान बोल रहा है ।

2. लडकी मैदान में दौडती है ।

3. औरत घर में काम करती है ।

4. मैं खाना खाता हूँ ।

5. वह कहानी लिखता है ।

6. ये बाजार जा रहे हैं ।

7. गाय मैदान में चरती है ।

8. यहाँ एक नेता है ।

6. ***किन्ही पाँच शब्दों के विलोम रूप लिखिए :-*** **5 X 1 = 5M L3**

1. अंधकार	**2.** लायक
3. अनुकूल	**4.** ज्ञान
5. सफल	**6.** उचित
7. बडा	**8.** नाम

7. ***अ) किन्हीं पाँच अंग्रेजी शब्दों को हिन्दी में रूपांतर कीजिए:-*** **5 X 1 = 5M L1**

1. Balance	**2.** Goods
3. Loss	**4.** Call letter
5. Advance	**6.** Cheque
7. Bill	**8.** Labour

आ) किन्ही पाँच हिन्दी शब्दों को अंग्रेजी में रूपांतर कीजिए :- **5 X 1 = 5M L1**

1. अनुदान
2. हिसाब
3. निधि
4. विभाग
5. पूंजी
6. दस्तावेज
7. श्रम
8. उद्योग

8. अवकरण कीजिए :- **10M L3**

आदर्श विद्यार्थी लगन और तपस्या की आँच में पिघलकर स्वयं को सोना बनाता है । जो छात्र सुख-सुविधा और आराम के चक्कर में पड़े रहते हैं, वे अ
पने जीवन की नींव को ही कमजोर बना लेते हैं । परिश्रमी विद्यार्थी को यदि सफलता न मिले, तो वह निराश नहीं होता है । बल्किवह बार-बार मेहनत करके
सफलता प्राप्त करता है । वह सदा यह जानने की इच्छा रखता हैं व जानने केलिए सचेष्ट रहता है कि कार्य में सफलता क्यों नहं मिली । वह यह भी जानता
ा है कि बिना परिश्रम के केवल इच्छा मात्र से ही कोई सफलता प्राप्त नहीं कर सकता । अर्थात, परिश्रम से ही कार्य पूर्ण होते हैं । इससे सिद्ध होता है कि सफ
लता करने के लिए हमें बार-बार अभ्यास एवं कठिन परिश्रम करने की आवश्यकता होती है । ठीक उसी प्रकार, जैसे रस्सी के बार-बार घिसने से पत्थर पर
भी निशान बनजाता है ।

1. उपरोक्त गद्यांश का उचित शीर्षक दीजिए ?
2. कौन लगन और तपस्या की आँच में पिघलकर स्वयं को सोना बनाता है ?
3. कार्य कैसे पूर्ण होते हैं ?
4. जीवन की नींव कमजोर क्यों हो जाती है ?
5. परिश्रमी विद्यार्थी असफल होने पर क्या करते हैं ?

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STATISTICS	STAP11A	2019 – 20 Onwards	B.A(EMS) / B.Sc.(MSCs & CAMS)

SEMESTER-I **Practical - I No of Credits: 1**

Title of the course :

Course Outcome	Course: STAP11A Upon successful completion of this course, students should have the knowledge and skills to:	P.O Mapping
CO 1	Applying the concepts of measures of central tendency and dispersion of real life problems.	PO5
CO 2	Applying the concepts of moments. Skewness and Kutosis of real time data	PO5
CO3	To Applying the Concept of curve fitting by the method of least squares	PO5
CO 4	Able to Obtain the Relation Between Two variables	PO6
CO 5	To Asses the Association using Yule's, Pearson's, Tchuprow's	PO5

CO-PO MATRIX								
COURSE CODE	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
STAP11A	CO1					M		
	CO2					H		
	CO3					H		
	CO4						M	
	CO5					L		

1. (a) Computation of Measures of Central Tendency (Mean, Median and Mode)
   (b) Computation of Measures of Dispersion (Q.D, M.D and S.D)
2. (a) Computation of non-central and central moments for grouped data.
   (b) Computation of coefficients of Skewness (Karl Pearson's and Bowley's methods)
3. Fitting of (a) straight line (b) parabola by the method of least squares.
4. Fitting of (a) Exponential curves of the type $y = ab^x$ and $y = ae^{bx}$ (b) Power curve by the method of least squares.
5. Computation of correlation coefficient and regression lines for ungrouped data
6. Computation of multiple and partial correlation coefficients for ungrouped data
7. Computation of Yule's coefficient of association and colligation.
8. Computation of Pearson's, and Tchuprow's coefficient of contingency

Structure of Practical Paper I

External Examination for 50 Marks

(i)	For Continuous Evaluation	–	10 marks
(ii)	For semester end practical Examination	_	40 marks

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SEMESTER- I **PAPER - I** **No of Credits: 4**

STATISTICS	STAT11A	2019 – 20 Onwards	B.A(EMS) / B.Sc.(MSCs, CAMS, M.S.Ds)

DESCRIPTIVE STATISTICS AND PROBABILITY

Title of the course : **DESCRIPTIVE STATISTICS AND PROBABILITY**		
Course Outcome	**Course: STAT11A** Upon successful completion of this course, students should have the knowledge and skills to:	**P.O Mapping**
CO 1	Understand how to Apply the concepts of moments, Skewness and Kurtosis for univariate data	PO5
CO 2	Get the Knowledge of curve fitting for straight line, parabola, exponential and power curve.	PO5
CO3	Examining regression analysis for bi-variate data.	PO5
CO 4	Implement the concepts of attributes and also measures of association	PO6
CO 5	Get the Knowledge of probability to Apply on various Uncertainty Situations.	PO5

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
STAT11A	**CO1**					**H**		
	CO2					**M**		
	CO3					**M**		
	CO4						**L**	
	CO5					**H**		

Univariate Data:

(i) Moments - Central and Non-central moments, inter-relationships,Sheppard's corrections for moments for grouped data.

(ii)Skewness : Def and measures of skewness by Karl Pearson's, Bowley's formulae and based on moments.

(iii) Kurtosis : Def, measurement of kurtosis based on moments, Simple problems.

Bivariate Data :

(i) Curve fitting: Principle of least squares, Fitting of straight line, Quadratic, Exponential and Power curves.

(ii) Correlation - Karl Pearson's correlation coefficient, and Spearman's rank correlation coefficient and their properties.

(iii) **Regression Analysis:** Simple linear regression, Properties of regression coefficients, simple problems

Multivariate Data : Concepts of Multiple and partial correlation coefficients (only for three variables).Multiple regression equation.

Attributes- Definition, independence and association of attributes, measures of association - Yule's coefficient of association and coefficient of colligation**.**

Probability-Basic Terminology in probability. Mathematical, Statistical and Axiomatic definitions of probability with Merits and demerits. . Addition and Multiplication theorems for 2 and n events, Boole's inequalities. Conditional probability, Bayes' theorem Simple problems

Text Book: Fundamentals of Mathematical Statistics, 11th Edition, 2010, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi

List of Reference Books:

1. B.A/B.Sc. First Year Statistics(2010) , Telugu Akademi, Hyderabad.
2. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and Chris P.Tsokos Academic Press(Elsevier), Haryana .
3. Probability and Statistics,Volume I, D.Biswas, New central book Agency (P) Ltd, New Delhi.
4. An outline of Statistical theory, Volume two,3rd Edition,2010(with corrections) A.M.Goon,M.K. Gupta, B.Dasgupta ,The World Press Pvt.Ltd., Kolakota.
5. Sanjay Arora and BansiLal:. New Mathematical Statistics, SatyaPrakashan, New Delhi.
6. Mathematical Statistics, 3rd edition, 2009, ParimalMukhopadhyay, Books &Allied(p) Ltd, Kolkata.

Model Paper Structure

Section A: Eight questions are to be set, of these five questions are to be answered. (5 x 5M= 25 M)

Section B: Two questions from each paragraph with internal choice. (5 x 10M = 50M)

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Model Paper

STATISTICS	STAT11A	2019 – 20 Onwards	B.A(EMS) / B.Sc.(MSCs & CAMS)

Section – A

Answer any FIVE of the following **5 x 5M = 25Marks**

1. Explain Sheppard's correction (L-2, CO-1)
2. Explain Bowley's coefficient of skewness (L-2,CO-1)
3. Explain correlation. What are the types of correlation? (L-2,L-1, CO-1)
4. Write the properties of regression coefficients. (L-1, CO-1)
5. Examine the consistency of the following data: (L-4, CO-3)
   (A) = 100; (B) = 150; (AB) = 60; N = 500
6. Explain partial and multiple correlation coefficients (L-2, CO-1)
7. State and prove addition theorem of probability for two events (L-1,L-3, CO-4)
8. If A and B are independent events, then prove that (L-3, CO-4)
   $i)\ \bar{A}\ and\ B$ $ii)\ \bar{A}\ and\ \bar{B}$ are also independent

Section – B

Answer ALL questions **5 x 10M = 50Marks**

9. A) Explain the relationship between central and non-central moments(L-2, CO-1)

(OR)

B) Show that the limits for Karl Pearson's coefficient of skewness lies

between -3 and +3 (L-3, CO-4)

10. A) Fit a straight line of the form $y = a + bx$ to the following data. Estimate the value of y when x = 7 (L-3, CO-4)

X	1	2	3	4	5	6
y	18	51	90	120	140	150

(OR)

B) Explain correlation coefficient and their limits are independent of change of origin and scale (L-2,CO-1)

11. A) Define multiple correlation coefficient and state its properties (L-1, CO-1)

(OR)

B) Find the regression equation of X_1 on X_2 and X_3 given the following results: (L-3,CO-4)

Trait	Mean	S.D.	r_{12}	r_{23}	r_{31}
X_1	28.02	4.42	0.8		
X_2	4.91	1.1		-0.56	
X_3	594	85			-0.4

Where X_1 = Seed per acre ;X_2 = Rainfall in inches; X_3 = Accumulated temperature

12. A) Calculate Yule's coefficient of association and Yule's coefficient of colligation from the following data (AB) = 60; $(A\beta)$ = 10; $(\alpha B) = 10$; $(\alpha\beta) = 50$(L-3, CO-4)

(OR)

B) Define consistency of data. Give the conditions for consistency of data for 2 & 3 attributes (L-1, CO-1)

13. A)State and prove multiplication theorem of probability for n events(L-1,L-3, CO-4)

(OR)

B) State and prove Baye's theorem (L-1,L-3, CO-4)

Department of Telugu

Academic Year 2019-2020

Parvathaneni Brahmayya Siddhartha College of Arts and Science Vijayawada 520010
(An autonomous college in the Jurisdiction of Krishna University. Machilipatnam)

Course Code : TEL T11

COURSE NAME	COURSE OUT COMES NO	COURSE OUT COMES	PO NO.
B.A, BBA, BBA (BA) B.COM (GEN), B.COM (CA), B.SC(MPCS), B.SC(BZC), B.SC(MECS), B.SC(MSCA)	CO 1	విద్యార్థులు నైతికంగా మానసిక పరిపక్వాన్ని పొంది సమాజ శ్రేయస్సుకు దోహతపడగలరు	3
	CO 2	ఆధునికమైన భావజాలంతో సమాజంలో దురయ్యే సమస్యలని ఎదుర్కొంటూ జీవితంలో ముందుకు సాగగలరు	1
	CO 3	విషయాన్ని సులభంగా గ్రహించి వానిని తన జీవితానికి అనుగుణంగా మార్చుకుని ఉత్తమ మార్గం వైపు ప్రయాణించగలరు	1
	CO 4	గ్రహించిన పాఠ్యాంశాల ద్వారా మన జ్ఞానం ఎంతవరకు అనేది కొలబద్ధంగా నిలబడుతుంది	6
	CO 5	మాట్లాడే భాషలో స్పష్టత ఎదుట వ్యక్తితో మాట్లాడేటప్పుడు మాటల్లోనే ఆకర్షణీయత కలిగి దానికి శాస్త్ర సమ్మతిని జోడించి మరింత చేరువయ్యేందుకు ఉపయోగకరంగా ఉంటుంది	2

CO - PO MATRIX

Course Code : TEL T11

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			M				
CO2	L						
CO3	L						
CO4						H	
CO5		L					

Telugu	TELT11	2019-20	B.A,B.Sc,,B.Com,B.Com Computers, Appilications, B.Com E-commerce,BBA,BBABA,B.Com TPP,BCA

Semester -I SYLLABUS Credits: 3

అభ్యసన ఫలితాలు :

CO 1 :విద్యార్థులు నైతికంగా మానసిక పరిపక్వాన్ని పొంది సమాజ శ్రేయస్సుకు దోహదపడగలరు

CO 2 :ఆధునికమైన భావజాలంతో సమాజంలో ఎదురయ్యే సమస్యలని ఎదుర్కొంటూ జీవితంలో ముందుకు సాగగలరు

CO 3 : విషయాన్ని సులభంగా గ్రహించి వానిని తన జీవితానికి అనుగుణంగా మార్చుకుని ఉత్తమ మార్గం వైపు ప్రయాణించగలరు

CO 4 :గ్రహించిన పాఠ్యాంశాల ద్వారా మన జ్ఞానం ఎంతవరకు అనేది కొలబద్ధంగా నిలబడుతుంది

CO 5 : మాట్లాడే భాషలో స్పష్టత ఎదుట వ్యక్తితో మాట్లాడేటప్పుడు మాటల్లోనే ఆకర్షణీయత కలిగి దానికి శాస్త్ర సమ్మతిని జోడించి మరింత చేరువయ్యేందుకు ఉపయోగకరంగా ఉంటుంది

ప్రాచీన కవిత్వం

1. గంగా శాంతనుల కథ - నన్నయ

(శ్రీ మహాభారతం ఆదిపర్వం నాల్గవ ఆశ్వాసం 120వ పద్యం నరవరుడగు శంతనునకు సురవధికిని నుండి 165 వ పద్యం దివ్యభూషణాలంకృత వరకు)

2. ద్రౌపతి పరివేదనం -తిక్కన

(శ్రీ మహాభారతం ఉద్యోగపర్వం తృతీయాశ్వాసం 100 వ పద్యం ధర్మనందను పలుకులు నుండి 125 పద్యం వరకు)

ఆధునిక కవిత్వం

1.కన్యక -గురజాడ అప్పారావు

2. దేశ చరిత్రలు -శ్రీశ్రీ

కథానికలు

1. చింతలతోపు -పాపినేని శివశంకర్

2. సావు కూడు - బండి నారాయణస్వామి

వ్యాకరణం

1.సంధులు :సవర్ణదీర్ఘ ,గుణ, యణాదేశ ,వృద్ధి ,అత్వ, ఇత్వా, త్రిక ,గసదవా దేశ ,రుగాగమా , ఆమ్రేడిత, సంధులు

2. సమాసాలు : తత్పురుష ,కర్మధారయ ,ద్వంద్వ ,ద్విగు , బహువ్రీహి సమాసాలు

అక్షర దోషాలు: : దోషాలు సరిదిద్ది సాధురూపాలు రాయాలి సరిదిద్ది

Parvathaneni Brahmayya Siddhartha College of Arts and Science Vijayawada 520010
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Telugu	TELT11	2019-20	B.A,B.Sc,,B.Com,B.Com Computers, Appilications, B.Com E-commerce,BBA,BBABA,B.Com TPP,BCA

Semester -I MODEL PAPER Credits: 3

1)ఈ క్రింది పద్యాలలో ఒకదానికి ప్రతిపదార్థ తాత్పర్య సహిత వ్యాకరణాంశాలను రాయండి 10M

1. అ)కని వనకన్యయో ధనుజ కన్యయో భుజగేంద్ర కన్యయో
అనిమిష కన్యయో ఇది వియచ్చరకన్యయో అపూర్వ మీ
వనకన్య కిట్టు లేకతను వచ్చునే మానవ కన్య యంచు న
య్యనఘుడు దాని చిత్తమున నాదట బోవక చూచె బ్రీతితోన్

ఆ)వరమున పుట్టితిన్ భరతవంశంబు జొ చ్చితి నందు పాండు భూ
వరునకు కోడలైతి వ్యందుల పొందితి నీతి విక్రమ
సిద్ధులకు పుత్రులను పడసితిన్ సహజనుల ప్రాపుగాంచితిన్
సరసి జనాధ ఇన్నిట ప్రసస్తికి నెక్కిన దాన ఎంతయున్ నెంతయున్

2) ఈ క్రింది వానిలో రెండింటికి సందర్భ సహిత వ్యాఖ్యలు రాయండి 2X5 = 10M

1. కుల గోత్ర నామము అడుగక దాని ఇష్టం సలుపుము
2. కలకలనవ్వుచు వికంగ కాలంబయ్యెన్
3. విద్యనేర్చినవాడు విప్రుడు
4. మానవ కథ వికాసమెట్టిది

3) ఈ క్రింది వానిలో రెండింటికి సమాధానాలు రాయండి 2X5 = 10M

1.గంగా ప్రతీపుల వృత్తాంతాన్ని వివరించండి
2. ద్రౌపతి పరి దేవనము ఆధారంగా తిక్కన కవితా లక్షణాలను విశ్లేషించండి
3. కన్యక జనులను ఉద్దేశించి ఏమని పలికింది
4. చీకటి కోణంలో పడిన ఎవరిని గురించి శ్రీ శ్రీ ప్రశ్నించాడు

4) గంగా శంతనుల కథ ఆధారంగా నన్నయ కవితా వైభవాన్ని రాయండి 10M

(లేదా)

ద్రౌపతి తన భంగపాటును కృష్ణునికి చెప్పిన విదమెట్టిది

5) కన్యక వృత్తాంతాన్ని తెలియజేయండి 10M

(లేదా)

గత చరిత్ర సారాన్ని శ్రీ శ్రీ విశ్లేషించిన విధమెట్టిది

6) చింతల తోపు కథలో వర్ణింపబడిన రైతుల కష్టనష్టాలను తెలియజేయండి 10M

(లేదా)

సావు కూడు కథను వివరించండి

7) ఈ క్రింది వానిలో మూడింటికి సంధి కార్యాలను రాయండి 3X2 = 6M

1. గురూప దేశము 2.దేవర్షి 3. పిత్రాజ్ఞ 4.నిగ్గుటద్దము 5.ఇచ్చలు 6.చిట్టచివర

8) ఈ క్రింది వానిలో రెండింటికి విగ్రహ వాక్యాలు రాసి సమాస నామాలు రాయండి 2X2 = 4M

1.శీతోష్ణము 2.చరణ కమలములు 3.పద్మాక్షి 4.రామకృష్ణులు

9) ఈ క్రింది పదాన్ని సరిదిద్ది సాధురూపాలని రాయండి 5X1 = 5M

1.పరుషం 2. మిత్రుడు 3.బేధము 4.యేనుగు 5.పాలకుడు

CO – PO MATRIX

Course Code : TEL T01

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1					H		
CO2	L						
CO3		L					
CO4		L					
CO5		L					

Telugu	TELT01	2019-20	B.A,B.Sc,,B.Com,B.Com Computers, Appilications, B.Com E-commerce,BBA,BBABA,B.Com TPP,BCA

SYLLABUS

semester –III & IV credits: 3

అభ్యసన ఫలితాలు

CO 1 ప్రాచీన పద్యభాగం గత వైభవాన్ని ప్రవర్తనలను తెలియజేయడం వలన మన నాగరికత సంస్కృతి తెలుసుకోవడానికి అవకాశం:

CO 2 : నూతన ఆలోచనలు కలిగి వాటిని వ్యక్తీకరించినట్లయితే దాని వలన ప్రయోజనం

CO 3 : గ్రహించవలసినది సులభంగా గ్రహించి తన భావాల్ని వ్యక్తీకరించేందుకు ఉపయోగపడటం

CO 4 : భాషలోని లయ సౌందర్యం అవగాహన చేసుకుని ఆచరించేందుకు సహకరించటం

CO 5: వినడానికి వినసంపైన మాటల పొందిగా ఇందులో కనిపిస్తుంది

ప్రాచీన కవిత్వం

1. వామనవతారం -పోతన

(శ్రీ మహా భాగవతం ఎనిమిదవ స్కంధం 582వ పద్యం నుండి 621)

2.శాలివాహన విజయం కొరవి గోపరాజు

(సింహాసనద్వాత్రింశికప్రథమ శ్వాసం 115 వ పద్యము నుండి 165 వ పద్యం వరకు)

3.ఆధునిక కవిత్వం

హరిజన శతకము -కుసుమ ధర్మన్న

వంటిల్లు -విమల

గద్యభాగం / వ్యాస సంపుటి

1. అభి వ్యక్తి నైపుణ్యాలు - సుబ్బారావు

2. వ్యక్తిత్వ వికాసం -ఆచార్య రాచపాలెం చంద్రశేఖరరెడ్డి

వ్యాకరణం

చందస్సు : ఉత్పలమాల, చంపకమాల,, శార్దూలం, కందం, తేటగీతి ,ఆటవెలది ,సీసం

అలంకారాలు : శబ్దాలంకారాలు, ఉపమా ,,ఉప్రేక్ష, రూపక ,స్వభావక్తి ,అతిశయోక్తి ,

అర్థాంతరన్యాసాలంకారాలు