



UG Program (4 Years Honors)
CBCS-2020-21

B.Sc.,
B.Sc., Data Science, Statistics, Computer Science (DSSStCs)



SYLLABUS

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DSST 0

UG Program (4 years Honors) Structure (CBCS)

2020-21 A. Y., onwards

BACHLOR OF SCIENCE

(3rd and 4th year detailed design will be followed as per APSCHE GUIDELINES)

Subjects/ Semesters	I		II		III		IV		V		VI						
	H/W	C	H/W	C	H/W	C	H/W	C	H/W	C	H/W	C					
Languages														THIRD PHASE of APPRENTICESHIP Entire 5th/ 6th Semester		FIRST and SECOND PHASES (2 spells) of APPRENTICESHIP between 1st and 2nd year and between 2nd and 3rd year (two summer vacations).	
English	4	3	4	3	4	3											
Language (H/T/S)	4	3	4	3	4	3											
Life Skill Courses	2	2	2	2	2+2	2+2											
Skill Development Courses	2	2	2+2	2+2	2	2											
Core Papers																	
M-1	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2	4+1								
M-2	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2	4+1								
M-3	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2	4+1								
M-1	SEC (C6,C7)									4+2	4+1						
M-2	SEC (C6,C7)									4+2	4+1						
M-3	SEC (C6,C7)									4+2	4+1						
Hrs/ W (Academic Credits)	30	25	32	27	32	27	36	30	36	30	0	12	4	4			
Project Work																	
Extension Activities (Non Academic Credits)																	
NCC/NSS/Sports/Extra Curricular									2								
Yoga						1		1									
Extra Credits																	
Hrs/W (Total Credits)	30	25	32	27	32	28	36	33	36	30	0	12	4	4			

M= Major; C= Core; SEC: Skill Enhancement Courses

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B.A/B.Sc Mathematics Syllabus (w.e.f : 2020-21 A.Y)

2.DETAILED OF COURSE TITLES & CREDITS

Marks & Credits distribution: UG-Sciences

Sl. No	Course type	No. of courses	Each course teaching Hrs/wk	Credit for each course	Total credits	Each course evaluation			Total marks
						Conti-Assess	Univ-exam	Total	
1	English	3	4	3	9	25	75	100	300
2	S.Lang	3	4	3	9	25	75	100	300
3	LS	4	2	2	8	0	50	50	200
4	SD	4	2	2	8	0	50	50	200
5	Core/SE -I	5+2	4+2	4+1	35	25	75+50	150	1050
	Core/SE -II	5+2	4+2	4+1	35	25	75+50	150	1050
	Core/SE -III	5+2	4+2	4+1	35	25	75+50	150	1050
6	Summer-Intern	2		4	8		100	200	200
7	Internship/ Apprentice/ on the job training	1		12	12		200	200	200
		38			159				4550
8	Extension Activities (Non Academic Credits)							2	
	NCC/NSS/Sports/ Extra Curricular				2	2		5	
	Yoga				2	2			
	Extra Credits							2	
	Total	40			142			5	

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1. LIFE SKILL AND SKILL DEVELOPMENT COURSES

Life /Skill development courses: 4 courses of LSC and 4 courses of SDC with options

Each course of 2 hrs/ week containing 3 units of syllabi for 30 hrs teaching with 2 credits based on 50 marks evaluation. No internal assessment. University sem-end exam:50 marks (2 Hrs)

Question paper would be in two sections (Section A and Section B) for 50 marks

Section A consisting of 8 questions covering two questions from each unit and the remaining to be from any unit. Student has to write 4 questions and each question carries 5 marks (i.e., 5 X 4 = 20 marks). Each question to be answered with 5-7 points/10-15 lines of answer with necessary diagram/equations/figure/flow charts, if necessary.

Section B consisting of 6 questions covering all units (i.e., from each unit two questions to be given with either or choice). Student has to write 3 questions and Each question carries 10 marks. (i.e., 10 X 3 = 30 marks). Each question to be answered with 10 to 15 points or 20 to 35 lines along with diagrams/equations/ figure/flow charts, if necessary.

List of Life Skill courses

Sem	No. of Courses	Course name	Preferred teaching department
I	1	Human Values and Professional Ethics (HVPE)	English/Telugu/Any Dept
		Entrepreneurship Development (ED)	Commerce
II	1	Information and Communication Technology (ICT)	Computers
		Indian Culture and Science (ICS)	History/Telugu
III	Compulsory	Environmental Education (EE)	Botany/Zoology/Environmental Science/ Any dept.
		Personality Development and Leadership (PDL)	English/Any Dept
	1	Analytical Skills (AS)	Maths/Statistics

List of Skill Development Courses along with their Semester-wise allotment with choices.

SEM	No. of courses	Names of courses	Preferred teaching department	
I	One	1. Tourism Guidance (or)	History/Any dept	
		2. Plant Nursery (or)	Botany	
		3. Electrical Appliances (or)	Physics	
		4. Insurance Promotion	Commerce	
II	Two (1 from A group and 1 from B Group)	'A' Group	1. Survey & Reporting (or)	Economics/History
			2. Business communication (or)	English
			3. Solar Energy (or)	Physics
			4. Agricultural Marketing	Commerce/Economics
		'B' Group	1. Social Work Methods (or)	Political science/social work
			2. Advertising (or)	Commerce
			3. Dairy Technology (or)	Zoology
			4. Performing Arts	Telugu
III	one	1. Disaster Management (or)	English/Telugu/Any dept	
		2. Online Business (or)	Commerce	
		3. Poultry Farming (or)	Zoology	
		4. Financial Markets	Economics/Commerce	



2. DETAILS OF PAPER TITLES & CREDITS

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./Week: Science: 4+2	Credits: Science: 4+1	Max. Marks Cont/ Internal/Mid Assessment	Max. Marks Sem- end Exam	
I	1	Introduction to Data Science and R Programming	T	4	4	25	75	
		Introduction to Data Science and R Programming	L	2	1	-	50	
II	2	Data Mining Concepts and Techniques	T	4	4	25	75	
		Data Mining Concepts and Techniques	L	2	1	-	50	
III	3	Python Programming For Data Analysis	T	4	4	25	75	
		Python Programming For Data Analysis	L	2	1	-	50	
IV	4	Big Data Analytics Using Spark	T	4	4	25	75	
		Big Data Analytics Using Spark	L	2	1	-	50	
	5	Data Visualization	T	4	4	25	75	
		Data Visualization	L	2	1	-	50	
V	6A	Data Analytics With Tableau	T	4	4	25	75	
		Data Analytics With Tableau Lab	L	2	1	-	50	
	7A	AI Concepts and Techniques With Python	T	4	4	25	75	
		AI Concepts and Techniques with Python Lab	L	2	1	-	50	
	OR							
	6B	Supervised ML With Python	T	4	4	25	75	
		Supervised ML with Python Lab	L	2	1	-	50	
	7B	Unsupervised ML With Python	T	4	4	25	75	
		Unsupervised ML with Python Lab	L	2	1	-	50	
	OR							
	6C	NLP With Python	T	4	4	25	75	
		NLP with Python Lab	L	2	1	-	50	
7C	Deep Learning Neural Networks With Python	T	4	4	25	75		
	Deep Learning Neural Networks With Python Lab	L	2	1	-	50		

Note : *Course type code: T: Theory, L: Lab, P: Problem solving.



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B.Sc Statistics Syllabus (w.e.f.2020-21 A.Y)

DETAILS OF COURSE TITLES & CREDITS

Sem	Course No	Course Name	Course Type (T/P/L)	Hrs/Week		Credits		Max. Marks		
				Science: 4+2	Science: 4+2	Count/Internal/ Mid Assessment	Sem- End Exam			
I	1	Descriptive Statistics	T	4	4	25	75			
		Practical	L	2	1	-	50			
II	2	Probability and Probability Distributions	T	4	4	25	75			
		Practical	L	2	1	-	50			
III	3	Statistical Inference	T	4	4	25	75			
		Practical	L	2	1	-	50			
IV	4	Sampling Techniques and Design of Experiments	T	4	4	25	75			
		Practical	L	2	1	-	50			
	5	Applied Statistics	T	4	4	25	75			
		Practical	L	2	1	-	50			
V	6A	Operations Research - I	T	4	4	25	75			
		Operations Research - I Lab	L	2	1	-	50			
	7A	Operations Research - II	T	4	4	25	75			
		Operations Research - II Lab	L	2	1	-	50			
	OR									
	6B	Statistical Process and Quality Control	T	4	4	25	75			
		Statistical Process and Quality Control Lab	L	2	1	-	50			
	7B	Computational Techniques and R Programming	T	4	4	25	75			
		Computational Techniques and R Programming Lab	L	2	1	-	50			
	OR									
	6C	Econometrics	T	4	4	25	75			
		Econometrics Lab	L	2	1	-	50			
7C	Regression Analysis	T	4	4	25	75				
	Regression Analysis Lab	L	2	1	-	50				

Note: *Course type code: T: Theory, L: Lab, P: Problem solving

Note 1: For Semester–V, for the domain subject **STATISTICS**, any one of the three pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (ABC allotment is random, not on any priority basis).

Note 2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate field skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the field skills embedded in the syllabus citing related real field situations.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

Note 3: To insert assessment methodology for Internship/ on the Job Training/Apprenticeship under the revised CBCS as per APSICHE Guidelines.

- **First internship (After 1st Year Examinations):** Community Service Project. To inculcate social responsibility and compassionate commitment among the students, the summer vacation in the intervening 1st and 2nd years of study shall be for Community Service Project (the detailed guidelines are enclosed).
- **Credit For Course: 04**

- **Second Internship (After 2nd Year Examinations):** Apprenticeship / Internship / on the job training / In-house Project / Off-site Project. To make the students employable, this shall be undertaken by the students in the intervening summer vacation between the 2nd and 3rd years (the detailed guidelines are enclosed).
- **Credit For Course: 04**

- **Third internship/Project work (6th Semester Period):**
During the entire 6th Semester, the student shall undergo Apprenticeship / Internship / On the Job Training. This is to ensure that the students develop hands on technical skills which will be of great help in facing the world of work (the detailed guidelines are enclosed).
Credit For Course:12

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B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

DETAILS OF PAPER TITLES & CREDITS

Sem	Course no.	Course Name	Course type (T/L/ P)	Hrs/Week Science: 4+2	Credits Science: 4+1	Max. Marks Cont/ Internal /Mid Assessment	Max. Marks Sem- end Exam	
I	1	Problem Solving in C	T	4	4	25	75	
		Problem Solving in C Lab	L	2	1	-	50	
II	2	Data Structures using C	T	4	4	25	75	
		Data Structures using C Lab	L	2	1	-	50	
III	3	Database Management System	T	4	4	25	75	
		Database Management System Lab	L	2	1	-	50	
IV	4	Object Oriented Programming using Java	T	4	4	25	75	
		Object Oriented Programming using Java Lab	L	2	1	-	50	
	5	Operating Systems	T	4	4	25	75	
		Operating Systems Lab using C/Java	L	2	1	-	50	
V	6A	Web Interface Designing Technologies	T	4	4	25	75	
		Web Interface Designing Technologies Lab	L	2	1	-	50	
	7A	Web Applications Development using PHP & MYSQL	T	4	4	25	75	
		Web Applications Development using PHP & MYSQL Lab	L	2	1	-	50	
	OR							
	6B	Internet of Things	T	4	4	25	75	
		Internet of Things Lab	L	2	1	-	50	
	7B	Application Development using Python	T	4	4	25	75	
		Application Development Using Python Lab	L	2	1	-	50	
	OR							
	6C	Data science	T	4	4	25	75	
		Data Science Lab	L	2	1	-	50	
7C	Python for Data science	T	4	4	25	75		
	Python for Data Science Lab	L	2	1	-	50		

Note: *Course type code: T: Theory, L: Lab, P: Problem solving

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B.Sc/B.A/B.Com/BCA/BBM,etc. ENGLISH Syllabus (w.e.f.2020-21 A.Y)

UG(English)	Semester - I	Credits: 03
Course - 1	A Course In Communication And Soft Skills	Hrs/Week: 04

Learning Outcomes:

By the end of the course the learner will be able to :

- Use grammar effectively in writing and speaking.
- Demonstrate the use of good vocabulary
- Demonstrate an understating of writing skills
- Acquire ability to use Soft Skills in professional and daily life.
- Confidently use the tools of communication skills

UNIT I: Listening Skills

- i. Importance of Listening
- ii. Types of Listening
- iii. Barriers to Listening
- iv. Effective Listening

UNIT II: Speaking Skills

- a. Sounds of English: Vowels and Consonants
- b. Word Accent
- c. Intonation

UNIT III: Grammar

- a) Concord
- b) Modals
- c) Tenses (Present/Past/Future)
- d) Articles
- e) Prepositions
- f) Question Tags
- g) Sentence Transformation (Voice, Reported Speech & Degrees of Comparison)
- h) Error Correction

UNIT IV: Writing

- v. Punctuation
- vi. Spelling
- vii. Paragraph Writing

UNIT V: Soft Skills

- a. SWOC
- b. Attitude
- c. Emotional Intelligence
- d. Telephone Etiquette
- e. Interpersonal Skills



పాఠ్య ప్రణాళిక

యూనిట్-I

రాజనీతి - నన్నయ
మహాభారతం-సభాపర్వం-ప్రథమాశ్వాసం-(26-57 పద్యాలు)

యూనిట్-II

దక్షయజ్ఞం - నన్నెచోడుడు
కుమారసంభవం-ద్వితీయాశ్వాసం-(49-86 పద్యాలు)

యూనిట్-III

ధౌమ్య ధర్మోపదేశము - తిక్కన
మహాభారతం-విరాటపర్వం-ప్రథమాశ్వాసం-(116-146) పద్యాలు

యూనిట్-IV

పలనాటి బెబ్బలి - శ్రీనాథుడు (పలనాటి వీరచరిత్ర-ద్విపద కావ్యం పుట 108-112
'బాలచంద్రుడు భీమంబగు సంగ్రామం బొనర్చుట.. (108)..
..... వెఱగంది కుంది' (112) సం. అక్కిరాజు ఉమాకాంతం
ముద్రణ.వి.కె.స్వామి, బెజవాడ 1911.

యూనిట్-V

సీతారావణ సంవాదం - మొల్ల
రామాయణము-సుందరకాండము-(40-87 పద్యాలు)

◆వ్యాకరణం

సంధులు: ఉత్ప, త్రిక, ద్రుతప్రకృతిక, సుగాగమ, ద్విరుక్తటకారాదేశ, యజాదేశ, వృద్ధి, శ్చుత్వ, జశ్చ, అనునాసిక సంధులు.

సమాసాలు: అవ్యయాభావ, తత్పురుష, కర్మధారయ, ద్వంద్వ, ద్విగు, బహువ్రీహి.

అలంకారాలు:

అర్థాలంకారాలు : ఉపమ, ఉత్పేక్ష, రూపక, స్వభావోక్తి, అర్థాంతరవ్యాస, అతిశయోక్తి.

శబ్దాలంకారాలు : అనుప్రాస (వృత్తనుప్రాస, చేకామప్రాస లాటానుప్రాస, అంత్యానుప్రాస)

ఛందస్సు

వృత్తాలు: ఉత్పలమాల, చంపకమాల, శార్దూలము, మత్తేభము;

జాతులు : కందం, ద్విపద; ఉపజాతులు : ఆటవెలది, తేటగీతి, సీసం మరియు ముత్యాలసరాలు



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B.Sc/B.A/B.Com/BBA.,etc., SANSKRIT Syllabus (w.e.f:2020-21 A.Y)

UG Courses	Semester - I	Credits:03
Course: I	Poetry, Prose & Grammar	Hrs/Weeks:04

- UNIT – I OLD POETRY:**
1. "Arya Padukabhishekaha",
Valmiki Ramayanam- Ayodhya Kanda, Sarga-100 Geetha Press,
Gorakhpur.
 2. " YakshaPrasnaha", Mahabharatam of Vedavyasa,
Vanaparva, Adhyaya -313, Geeta Press, Gorakhpoo.
- UNIT – II MODERN POETRY:**1. "Mevada Rajyastapanam" 4th Canto, Srīmat Pratapa
Ranayanam, Mahakavyam, Pt.Ogeti Parikshit sarma,
Published by, Pt.Ogeti Parikshitsarma, 10/11,
Sakal nagar, Pune, 1989.
2. "VivekanandaSuktayaha", Vivekanandasuktisudha by
Dr.SamudralaLakshmanaiah, Published by Author, 18-1-84, Yasoda
Nagar, Tirupati. Selected Slokas 25.
- UNIT – III PROSE:**
1. "Atyutkataihi papapunyairihaiva phalamsnute",
Hitopadesaha-Mitralabha 2 & 3 stories, Pages 61-84.
 2. " Sudraka -Veeravarakatha", Hitopadesaha-Vigraham,
8th story, Pages 63-70,Chowkhamba krishadas academy,Varanasi,
2006.
- UNIT - IV GRAMMAR:**1.DECLENSIONS Nouns ending in vowels
Deva, Kavi, Bhanu, Dhatru, Pitru, Go, Ramaa, Mati.
- 2.CONJUGATIONS**
- 1st Conjugation - Bhoo, Gam, Shtha, Drusir, Labh, Mud.
- 2nd Conjugation - As. 10th Conjugation – Bhaash.
- UNIT – V GRAMMAR:** 1. SANDHI - Swara Sandhi : Savarnadeergha, ayavayava,
Guna,Vruddhi, yaanadesa.
-Halsandhi:Schutva, Stutva, Anunasika.2. SAMASA
Dwandwa, Tatpurusha, Karmadharaya,, Dwigu.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc/B.A/B.Com General HINDI Syllabus (w.e.f:2020-21 A.Y)

UG(General HINDI)	Semester - I	Credits:03
Course :1	Prose, Short Stories, Grammar and Letter Writing	Hrs/Weeks:04

UNIT 1

गद्य संदेश (Prose)(सं. डा. वी. एल. नरसिंहन शिवकोटि)

1. साहित्य की महत्ता
2. मित्रता
- 3.पृथ्वीराज की ओखें

UNIT 2

कथा लोक (Short Stories)(सं. डा. घनश्याम)

- 1.मुक्तिचक्र
- 2.गूढसई
- 3.उसने कहा था

UNIT 3

व्याकरण (Grammar)(सरल हिन्दी व्याकरण, दक्षिण भारत हिन्दी प्रचार सभा, मद्रास)

लिंग, वचन, काल, वाच्य।

UNIT 4

कार्यालयीन शब्दावली : अंग्रेजी से हिंदी और हिंदी से अंग्रेजी

(Changing Administrative Terminology Hindi to English and English to Hindi)

UNIT 5

पत्र लेखन : वैयक्तिक पत्र(छुट्टी पत्र, पिता, मित्र के नाम पत्र, पुस्तक विद्येता के नाम पत्र

**** **



UG- LIFE SKILL COURSE

HUMAN VALUES AND PROFESSIONAL ETHICS (HVPE)

(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (LS)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 hrs)
I	Life skill course	Human values and professional ethics (HVPE)	30	2	2	50 Marks

Objective: Learning Outcome: On completion of this course, the UG students will be able to:

- Understand the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- Understand the value of harmonious relationship based on trust and respect in their life and profession
- Understand the role of a human being in ensuring harmony in society and nature.
- Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

UNIT: 1 - Introduction – Definition, Importance, Process & Classifications of Value Education:

Understanding the need, basic guidelines, content and process for Value Education Understanding the thought provoking issues; need for Values in our daily life Choices making – Choosing, Cherishing & Acting, Classification of Value Education: understanding Personal Values, Social Values, Moral Values & Spiritual Values.

UNIT: 2 - Harmony in the Family – Understanding Values in Human Relationships:

Understanding harmony in the Family- the basic unit of human interaction, Understanding the set of proposals to verify the Harmony in the Family; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship, Present Scenario: Differentiation (Disrespect) in relationships on the basis of body, physical facilities, or beliefs.

Understanding the Problems faced due to differentiation in Relationships. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyavastha*) - from family to world family.

UNIT: 3 - Professional Ethics in Education: Understanding about Professional Integrity, Respect & Equality, Privacy, Building Trusting Relationships. Understanding the concepts; Positive co-operation, Respecting the competence of other professions. Understanding about Taking initiative and Promoting the culture of openness. Depicting Loyalty towards Goals and objectives.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Bhatia, R. & Bhatia, A (2015) Role of Ethical Values in Indian Higher Education.

References books:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Susan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
5. A Nagraj, 1998, JeevanVidyaEkParichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.

Co-curricular Activities:

1. Visit to an Old Age Home and spending with the inmates for a day.
2. Conduct of Group Discussions on the topics related to the syllabus.
3. Participation in community service activities.
4. Working with a NGO like Rotary Club or Lions International, etc.



UG- LIFE SKILL COURSE
ENTREPRENEURSHIP DEVELOPMENT (ED)
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (LS)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 hrs)
1	Life skill course	Entrepreneurship Development	30	2	2	50 Marks

Course Objective: A Generic Course that is intended to inculcate an integrated personal Life Skill to the student.

Learning Outcomes:

After successful completion of the course the student will be able to;

- Understand the concept of Entrepreneurship, its applications and scope.
- Know various types of financial institutions that help the business at Central, State and Local Level
- Understand Central and State Government policies, Aware of various tax incentives, concessions
- Applies the knowledge for generating a broad idea for a starting an enterprise/start up
- Understand the content for preparing a Project Report for a start up and differentiate between financial, technical analysis and business feasibility.

Unit-I: Entrepreneurship: Definition and Concept of entrepreneurship - Entrepreneur Characteristics – Classification of Entrepreneurs –Role of Entrepreneurship in Economic Development –Start-ups.

Unit-II: Idea Generation and Project Formulation: Ideas in Entrepreneurships – Sources of New Ideas – Techniques for Generating Ideas – Preparation of Project Report –Contents; Guidelines for Report preparation – Project Appraisal Techniques –Economic Analysis-Financial Analysis-Market Analysis.

Unit-III: Institutions Supporting and Taxation Benefits: Central level Institutions: NABARD; SIDBI,– State Level Institutions –DICs – SFC - Government Policy for MSMEs - Tax Incentives and Concessions.

Reference Books:

1. Arya Kumar, Entrepreneurship, Pearson, Delhi
2. Poornima MCH, Entrepreneurship Development –Small Business Enterprises, Pearson, Delhi
3. Sangeetha Sharma, Entrepreneurship Development, PHI Learning
4. KanishkaBedi, Management and Entrepreneurship, Oxford University Press, Delhi
5. Anil Kumar, S., ET.al., Entrepreneurship Development, New Age International Publishers, New Delhi
6. Khanka, SS, Entrepreneurship Development, S. Chand, New Delhi
7. Peter F. Drucker, Innovation and Entrepreneurship
8. A.Sahay, M. S. Chhikara, New Vistas of Entrepreneurship: Challenges & Opportunities
9. Dr B E V L Naidu, Entrepreneurship. Seven Hills Publishers

Suggested Co-Curricular Activities (As far as possible)

1. Group Discussion
2. Debate
3. Seminar
4. Visit to an SSI and preparing of an outline Report
5. Invited Lecture by a Bank Employee on the Bank Support to a Start Up.
6. Chart showing tax concessions to SSI, MSME both direct and indirect.



UG- SKILL DEVELOPMENT COURSE
TOURISM GUIDANCE
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
I	Skill Development Course	Tourism Guidance	30	2	2	50 Marks

Learning Outcomes:

By successful completion of the course, students will be able to:

- Understand the basic tourism aspects .
- Comprehend the requirements, role and responsibilities of profession of a Tourist Guide
- Apply the knowledge acquired in managing different groups and guiding in a tour
- Explain basic values related to tourism and heritage

Unit I:

(06 hrs)

Tourism – What is Tourism - Characteristics of Tourist Places – Guidance in Tourism - Meaning of Guidance – Types of Tour Guidance - Government/Department Regulations

Unit II:

(10 hrs)

Types of Guides – Characteristics of a Guide - Duties and Responsibilities of a Guide - The Guiding Techniques –Guide’s personality- Training Institutions – Licence.

Leadership and Social Skills - Presentation and Communication Skills - Working with different age and linguistic groups - Working under difficult circumstances – Precautions at the site -Relationship with Fellow Guides and Officials.

Unit III:

(10 hrs)

Guest Relationship Management- Personal and Official - Arrangements to Tourists – Coordinating transport - VISA/Passport -Accident/Death -Handling Guests with Special Needs/ Different Abilities – Additional skills required for Special/Adventure Tours - Knowledge of Local Security and Route Chart – Personal Hygiene and Grooming - Checklist - Code of Conduct

Co-curricular Activities Suggested:

(04 hrs)

1. Assignments, Group discussion, Quiz etc.
2. Invited lecture/training by local tourism operators/expert/guides
3. Visit to local Tourism Department office and a tourist service office
4. Organisation of college level short-duration tours to local tourist sites.

Reference Books:

1. Jagmohan Negi (2006); Travel Agency and Tour Operations, Kanishka Publishers, New Delhi
2. Mohinder Chand (2009); Travel Agency and Tour Operations: An Introductory Text, Anmol Publications Pvt. Limited, New
3. Pat Yale(1995); Business of Tour Operations, Longman Scientific & Technical, New Delhi
4. Websites on Tourism guidance.



UG- SKILL DEVELOPMENT COURSE
PLANT NURSERY
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
1	Skill Development Course	Plant Nursery	30	2	2	50 Marks

Learning Outcomes: On successful completion of this course students will be able to;

- Understand the importance of a plant nursery and basic infrastructure to establish it.
- Explain the basic material, tools and techniques required for nursery.
- Demonstrate expertise related to various practices in a nursery.
- Comprehend knowledge and skills to get an employment or to become an entrepreneur in plant nursery sector.

Unit-1: Introduction to plant nursery: (06 Hrs)

1. Plant nursery: Definition, importance.
2. Different types of nurseries –on the basis of duration, plants produced, structure used.
3. Basic facilities for a nursery; layout and components of a good nursery.
4. Plant propagation structures in brief.
5. Bureau of Indian Standards (BIS-2008) related to nursery.

Unit- 2: Necessities for nursery: (09 Hrs)

1. Nursery beds – types and precautions to be taken during preparation.
2. Growing media, nursery tools and implements, and containers for plant nursery, in brief.
3. Seeds and other vegetative material used to raise nursery in brief.
4. Outlines of vegetative propagation techniques to produce planting material.
5. Sowing methods of seeds and planting material.

Unit-3: Management of nursery: (09 Hrs)

1. Seasonal activities and routine operations in a nursery.
2. Nursery management – watering, weeding and nutrients; pests and diseases.
3. Common possible errors in nursery activities.
4. Economics of nursery development, pricing and record maintenance.
5. Online nursery information and sales systems.

Suggested Co-curricular activities: (6 Hrs)

1. Assignments/Group discussion/Quiz/Model Exam.
2. Demonstration of nursery bed making.
3. Demonstration of preparation of media for nursery.
4. Hands on training on vegetative propagation techniques.
5. Hands on training on sowing methods of seeds and other material.
6. Invited lecture cum demonstration by local expert.
7. Watching videos on routine practices in plant nurseries.
8. Visit to an agriculture/horticulture /forest nursery.
9. Case study on establishment and success of a plant nursery.

Reference books:

1. Ratha Krishnan, M., et.al. (2014) *Plant nursery management: Principles and practices*, Central Arid Zone Research Institute (ICAR), Jodhpur, Rajasthan
2. Kumar, N., (1997) *Introduction to Horticulture*, Rajalakshmi Publications, Nagercoil.
3. Kumar Mishra, K., N.K. Mishra and Satish Chand (1994) *Plant Propagation*, John Wiley & Sons, New Jersey.



UG- SKILL DEVELOPMENT COURSE
ELECTRICAL APPLIANCES
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
I	Skill Development Course	Electrical Appliances	30	2	2	50 Marks

Learning Outcomes: By successful completion of the course, students will be able to:

- Acquire necessary skills/hand on experience/ working knowledge on multimeters, galvanometers, ammeters, voltmeters, ac/dc generators, motors, transformers, single phase and three phase connections, basics of electrical wiring with electrical protection devices.
- Understand the working principles of different household domestic appliances.
- Check the electrical connections at house-hold but will also learn the skill to repair the electrical appliances for the general troubleshoots and wiring faults.

UNIT-I :

(6 hrs)

Voltage, Current, Resistance, Capacitance, Inductance, Electrical conductors and Insulators, Ohm's law, Series and parallel combinations of resistors, Galvanometer, Ammeter, Voltmeter, Multimeter, Transformers, Electrical energy, Power, Kilowatt hour (kWh), consumption of electrical power

UNIT-II :

(10 hrs)

Direct current and alternating current, RMS and peak values, Power factor, Single phase and three phase connections, Basics of House wiring, Star and delta connection, Electric shock, First aid for electric shock, Overloading, Earthing and its necessity, Short circuiting, Fuses, MCB, ELCB, Insulation, Inverter, UPS

UNIT-III:

(10 hrs)

Principles of working, parts and servicing of Electric fan, Electric Iron box, Water heater; Induction heater, Microwave oven; Refrigerator, Concept of illumination, Electric bulbs, CFL, LED lights, Energy efficiency in electrical appliances, IS codes & IE codes.

Co-curricular Activities (Hands on Exercises):

(04 hrs)

[Any four of the following may be taken up]

1. Studying the electrical performance and power consumption of a given number of bulbs connected in series and parallel circuits.
2. Measuring parameters in combinational DC circuits by applying Ohm's Law for different resistor values and voltage sources
3. Awareness of electrical safety tools and rescue of person in contact with live wire.
4. Checking the specific gravity of lead acid batteries in home UPS and topping-up with distilled water.
5. Identifying Phase, Neutral and Earth on power sockets.
6. Identifying primary and secondary windings and measuring primary and secondary voltages in various types of transformers.
7. Observing the working of transformer under no-load and full load conditions.
8. Observing the response of inductor and capacitor with DC and AC sources.
9. Observing the connections of elements and identify current flow and voltage drops.
10. Studying electrical circuit protection using MCBs, ELCBs
11. Assignments, Model exam etc.

Reference Books:

1. A Text book on Electrical Technology, B.L.Theraja, S.Chand& Co.,
2. A Text book on Electrical Technology, A.K.Theraja.
3. Performance and design of AC machines, M.G.Say, ELBSEdn.,
4. Handbook of Repair & Maintenance of domestic electronics appliances; BPB Publications
5. Consumer Electronics, S.P.Bali, Pearson
6. Domestic Appliances Servicing, K.P.Anwer, Scholar Institute Publications



UG- SKILL DEVELOPMENT COURSE
INSURANCE PROMOTION
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
I	Skill Development Course	Insurance Promotion	30	2	2	50 Marks

Learning Outcomes:

By successful completion of the course, students will be able to;

- Understand the field level structure and functioning of insurance sector and it's role in protecting the risks.
- Comprehend pertaining skills and their application for promoting insurance coverage
- Prepare better for the Insurance Agent examination conducted by IRDA
- Plan 'promoting insurance coverage practice' as one of the career options.

UNIT I:

Section I:

(06 Hrs)

Introduction of Insurance - Types of insurances. Growth of Insurance sector in India - Regulatory mechanism (IRDA) - Its functions

UNIT II:

Section II:

(10 Hrs)

Life Insurance plans. Health insurance plans. Products and features. Contents of documents- Sales Promotion methods - Finding prospective customers -Counselling - Helping customers in filing - Extending post-insurance service to customers.

UNIT III:

Section III:

(10 Hrs)

General Insurance - It's products (Motor, Marine, Machinery, Fire, Travel and Transportation) and features. Contents of documents. Dealing with customers - Explaining Products to Customers - Promoting Customer loyalty. Maintenance of Records.

Co-curricular Activities Suggested:

(4 hrs)

1. Collection of pamphlets of various insurance forms and procedures
2. Invited Lectures by Development Officers concerned
3. Mock practice of selling of insurance products
4. Preparation of working documents
5. Assignments, Group discussion, Quiz etc.

Reference books:

1. Principles of Insurance, Himalaya publishing House
2. Principles and Practice of Insurance, "
3. Fundamentals of insurance, "
4. Life and General Insurance Management, "
5. Financial services, Tata McGraw hill
6. Insurance Principles and Practices, Sultan Chand & Sons
7. Websites on insurance promotion



4.Details of course-wise Syllabus

B. Sc	Semester: I	Credits:4
Course: 1	INTRODUCTION TO DATA SCIENCE AND R PROGRAMMING	Hrs/Wk: 4

Aim and objectives of Course :

Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight. This course will introduce students to the collection, Preparation, analysis, modelling and visualization of data, covering both conceptual and practical issues. Examples and case studies from diverse fields will be presented, and hands- on use of statistical and data manipulation software will be included.

Learning outcomes of Course:

- Recognize the various discipline that contribute to a successful data science effort.
- Understand the processes of data science identifying the problem to be solved, data collection, preparation, modeling, evaluation and visualization.
- Be aware of the challenges that arise in Data Sciences.
- Be able to identify the application of the type of algorithm based on the type of the problem.
- Be comfortable using commercial and open source tools such as the R/Python language and its associated libraries for data analytics and Visualization.

UNIT I:

Defining Data Science and Big data, Benefits and Uses, facets of Data, Data Science Process. History and Overview of R, Getting Started with R, R Nuts and Bolts

UNIT II:

The Data Science Process: Overview of the Data Science Process-Setting the research goal, Retrieving Data, Data Preparation, Exploration, Modeling, data Presentation and Automation. Getting Data in and out of R, Using reader package, Interfaces to the outside world.

UNIT III:

Machine Learning: Understanding why data scientists use machine learning-What is machine learning and why we should care about, Applications of machine learning in data science, Where it is used in data science, The modeling process, Types of Machine Learning-Supervised and Unsupervised.

UNIT IV:

Handling large Data on a Single Computer: The problems we face when handling large data, General Techniques for handling large volumes of data, Generating programming tips for dealing with large datasets. Case study- Predicting malicious URLs(This can be implemented in R).

UNIT V:

Sub setting R objects, Vectorised Operations, Managing Data Frames with the dplyr, Control structures, functions, Scoping rules of R, Coding Standards in R, Loop Functions, Debugging, Simulation



TEXT BOOKS:

1. DavyCielen, Arno.D.B.Maysman, Mohamed Ali, "Introducing Data Science" ManningPublications, 2016.
2. Roger D. Peng, "R Programming for DataScience" Lean Publishing, 2015.

REFERENCE BOOKS:

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd., 2014.



B. Sc	Semester: I	Credits:1
Course: 1	Introduction To Data Science and R Programming Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Installing R and R studio
2. Basic operations in r
3. Getting data into R, Basic data manipulation, Loading Data into R
4. Basic plotting
5. Loops and functions
6. Create Vectors, Lists, Arrays, Matrices, Data frames and operations on them.
7. Demonstrate the visualization and graphics using visualization packages.
8. Implement Loop functions with lapply(), sapply(), tapply(), apply(), mapply().
9. Explore data using Single Variables: Unimodal, Bimodal, Histograms, Density Plots, Barcharts
10. Explore data using two Variables: Line plots, Scatter Plots, smoothing cures, Bar charts
11. Explore and implement commands using dplyr package
12. Generate random numbers and set seed

RECOMMENDED TEXT BOOKS:

1. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012.
 2. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.
- Recommended Reference books:
3. The art of R Programming: A tour of Statistical Software design. Norman Matloff. KindleEdition
 4. The book of R : The first course in Programming and Statistics by Tilman M. Davies.

Recommended Co-curricular activities: (Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and grouplearning)

A. Measurable:

1. Assignments on:
2. Student seminars (Individual presentation of papers) on topics relating to:
3. Quiz Programmes on:
4. Individual Field Studies/projects:
5. Group discussion on:
6. Group/Team Projects on:

B. General

1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.
5. Recommended Continuous Assessment methods:



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: I	Credits: 4
Course: 1	Descriptive Statistics	Hrs/Wk: 4

Course Learning Outcomes:

Students will acquire:

- knowledge of Statistics and its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.
- knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency and dispersion etc.
- knowledge of other types of data reflecting quality characteristics including concepts of independence and association between two attributes,
- insights into preliminary exploration of different types of data.
- Knowledge of correlation, regression analysis, regression diagnostics, partial and multiple correlations.

UNIT I:

Introduction to Statistics: Importance of Statistics. Scope of Statistics in different fields. Concepts of primary and secondary data. Diagrammatic and graphical representation of data: Histogram, frequency polygon, Ogives, Pie. Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean. Median and Mode through graph.

UNIT II:

Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non-Central moments and their interrelationship. Sheppard's correction for moments. Skewness and kurtosis.

UNIT III:

Curve fitting: Bi- variate data, Principle of least squares, fitting of degree polynomial. Fitting of straight line, Fitting of Second degree polynomial or parabola, Fitting of power curve and exponential curves.

Correlation: Meaning, Types of Correlation, Measures of Correlation: Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient (with and without ties), Bi-variate frequency distribution, correlation coefficient for bi-variate data and simple problems. Concept of multiple and partial correlation coefficients (three variables only) and properties

UNIT IV:

Regression : Concept of Regression, Linear Regression: Regression lines, Regression coefficients and it's properties, Regressions lines for bi-variate data and simple problems. Correlation vs regression.

UNIT-V

Attributes : Notations, Class, Order of class frequencies, Ultimate class frequencies, Consistency of data, Conditions for consistency of data for 2 and 3 attributes only , Independence of attributes , Association of attributes and its measures, Relationship between association and colligation of attributes, Contingencytable: Square contingency, Mean square contingency, Coefficient of mean square contingency, Tschuprow's coefficient of contingency.



TEXT BOOKS:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

REFERENCE BOOKS:

1. Willam Feller: Introduction to Probability theory and its applications. Volume -I, Wiley
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishinghouse.
4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
5. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , New Delhi



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: I	Credits: 1
Course: I(L)	Practical	Hrs/Wk: 2

List of the experiments:

1. Graphical presentation of data (Histogram, frequency polygon, Ogives).
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of measures of central tendency (Mean, Median and Mode)
4. Computation of measures of dispersion (Q.D, M.D and S.D)
5. Computation of non-central, central moments, β_1 and β_2 for ungrouped data.
6. Computation of non-central, central moments, β_1 and β_2 and Sheppard's corrections for grouped data.
7. Computation of Karl Pearson's coefficients of Skewness and Bowley's coefficients of Skewness.
8. Fitting of straight line by the method of least squares
9. Fitting of parabola by the method of least squares
10. Fitting of power curve of the type by the method of least squares.
11. Fitting of exponential curve of the type and by the method of least squares.
12. Computation of correlation coefficient and regression lines for ungrouped data
13. Computation of correlation coefficient, forming regression lines for grouped data
14. Computation of Yule's coefficient of association
15. Computation of Pearson's, Tchebyshev's coefficient of contingency

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall be exported to MS word for writing inference.



DETAILS OF COURSE-WISE SYLLABUS

B Sc	Semester: I	Credits: 4
Course: I	PROBLEM SOLVING IN C	Hrs/Wk: 4

Aim and objectives of Course:

- This course aims to provide exposure to problem-solving through programming.
- It introduces the concepts of the C Programming language.

Learning outcomes of Course:

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

- Understand the evolution and functionality of a Digital Computer.
- Apply logical skills to analyse a given problem
- Develop an algorithm for solving a given problem.
- Understand 'C' language constructs like Iterative statements, Arrayprocessing, Pointers.
- Apply 'C' language constructs to the algorithms to write a 'C' languageprogram.

3. Detailed Syllabus: (Five units with each unit having 12 hours of class work)

UNIT I:

General Fundamentals: Introduction to computers: Block diagram of a computer, characteristics and limitations of computers, applications of computers, types of computers, computer generations.

Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms, Flow Charts, Programming Languages – Generations of Programming Languages – Structured Programming Language- Design and Implementation of Correct, Efficient and Maintainable Programs.

UNIT II:

Introduction to C: Introduction – Structure of C Program – Writing the first C Program – File used in C Program – Compiling and Executing C Programs – Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples.

Decision Control and Looping Statements: Introduction to Decision Control Statements– Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement

UNIT III:

Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array– Operations on Arrays – one dimensional, two dimensional and multi dimensional arrays, character handling and strings.

UNIT IV:

Functions: Introduction – using functions – Function declaration/ prototype – Functiondefinition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.

Structure, Union, and Enumerated Data Types: Introduction – Nested Structures – Arrays of Structures – Structures and Functions– Union – Arrays of Unions Variables – Unions inside Structures – Enumerated Data Types.

UNIT V:

Pointers: Understanding Computer Memory – Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers - Passing Arguments to Functions using Pointer – Pointer and Arrays – Memory Allocation in C Programs – Memory Usage – Dynamic Memory Allocation – Drawbacks of Pointers

Files: Introduction to Files – Using Files in C – Reading Data from Files – Writing Data to Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

TEXT BOOKS:

1. E Balagurusamy – Programming in ANSIC – Tata McGraw-Hill publications.
2. Brain W Kernighan and Dennis M Ritchie - The ‘C’ Programming language” - Pearson publications.

REFERENCES:

1. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publications.
2. Yashavant Kanetkar - Let Us ‘C’ – BPB Publications.



B Sc	Semester: I	Credits: 1
Course: I(L)	PROBLEM SOLVING IN C Lab	Hrs/Wk: 2

1. Details of Lab Syllabus: Problem solving in C LAB

1. Write a program to check whether the given number is Armstrong or not.
2. Write a program to find the sum of individual digits of a positive integer..
3. Write a program to generate the first n terms of the Fibonacci sequence.
4. Write a program to find both the largest and smallest number in a list of integer values
5. Write a program to demonstrate refaction of parameters in swapping of two integervalues using Call by Value & Call by Address
6. Write a program that uses functions to add two matrices.
7. Write a program to calculate factorial of given integer value using recursive functions
8. Write a program for multiplication of two N X N matrices.
9. Write a program to perform various string operations.
10. Write a program to search an element in a given list of values.
11. Write a program to sort a given list of integers in ascending order.
12. Write a program to calculate the salaries of all employees using *Employee (ID, Name, Designation, Basic Pay, DA, HRA, Gross Salary, Deduction, Net Salary)* structure.
 - a. DA is 30 % of Basic Pay
 - b. HRA is 15% of Basic Pay
 - c. Deduction is 10% of (Basic Pay + DA)
 - d. Gross Salary = Basic Pay + DA+ HRA
 - e. Net Salary = Gross Salary – Deduction
13. Write a program to illustrate pointer arithmetic.
14. Write a program to read the data character by character from a file.
15. Write a program to create *Book (ISBN, Title, Author, Price, Pages, Publisher)* structure and store book details in a file and perform the following operations
 - a. Add book details
 - b. Search a book details for a given ISBN and display book details, if available
 - c. Update a book details using ISBN
 - d. Delete book details for a given ISBN and display list of remaining Books



5. RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms 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 (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

B. General

1. Group Discussion
2. Try to solve MCQ's available online.
3. Others

6. RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Problem-solving exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports like "Creating Text Editor in C".
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs form individual and collaborative work.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc/B.A/B.Com/BCA/BBM,etc. ENGLISH Syllabus (w.e.f:2020-21 A.Y)

UG(English)	Semester -II	Credits: 03
Course - 2	A Course In Reading & Writing Skills	Hrs/Week: 04

Learning Outcomes:

By the end of the course the learner will be able to :

- Use reading skills effectively
- Comprehend different texts
- Interpret different types of texts
- Analyse what is being read
- Build up a repository of active vocabulary
- Use good writing strategies
- Write well for any purpose
- Improve writing skills independently for future needs

UNIT I:

Prose : 1. How to Avoid Foolish Opinions Bertrand Russell

Skills : 2. Vocabulary: Conversion of Words

: 3. One Word Substitutes

: 4. Collocations

UNIT II:

Prose : 1. The Doll's House Katherine Mansfield

Poetry : 2. Ode to the West Wind P B Shelley

Non-Detailed Text : 3. Florence Nightingale Abrar Mohsin

Skills : 4. Skimming and Scanning

UNIT III:

Prose : 1. The Night Train at Deoli Ruskin

BondPoetry : 2. Upagupta Rabindranath

Tagore

Skills : 3. Reading Comprehension

: 4. Note Making/Taking

UNIT IV

Poetry : 1. Coromandel Fishers Sarojini Naidu

Skills : 2. Expansion of Ideas

: 3. Notices, Agendas and Minutes

UNIT V:

Non-Detailed Text : 1. An Astrologer's Day R K Narayan

Skills : 2. Curriculum Vitae and Resume

: 3. Letters

: 4. E-Correspondence



పాఠ్య ప్రణాళిక

యూనిట్-I : ఆధునిక కవిత్వం

1. ఆధునిక కవిత్వం- పరిచయం
2. కొండవీడు - దువ్వూరి రామిరెడ్డి
(‘కవికోకిల’ గ్రంథావళి-ఖండకావ్యాలు-నక్షత్రమాల సంపుటి నుండి)
3. మాతృసంగీతం - అనిసెట్టి సుబ్బారావు (‘అగ్నివీణ’ కవితాసంపుటి నుండి)
4. ‘తాతకో నూలుపోగు’ - బండారు ప్రసాదమూర్తి (‘కలనేత’ కవితాసంపుటి నుండి)

యూనిట్-II : కథానిక

5. తెలుగు కథానిక - పరిచయం
6. భయం (కథ) - కాళీపట్నం రామారావు
7. స్వేదం ఖరీదు....? - (కథ) - రెంటాల నాగేశ్వరరావు

యూనిట్-III : నవల

8. తెలుగు ‘నవల’ - పరిచయం
9. రథచక్రాలు (నవల) - మహీధర రామ్మోహన రావు (సంక్షిప్త ఇతివృత్తం మాత్రం)
10. రథచక్రాలు (సమీక్షా వ్యాసం) - డా॥ యల్లాప్రగడ మల్లికార్జునరావు

యూనిట్-IV: నాటకం

11. తెలుగు ‘నాటకం’ - పరిచయం
12. యక్షగానము (నాటిక) - ఎం.వి.ఎస్. హరనాథరావు.
13. “అపురూప కళాదూపాల విధ్వంసదృశ్యం ‘యక్షగానము’ (సమీక్షా వ్యాసం)”
-డా॥కందిమళ్ళసాంబశివరావు

యూనిట్-V: విమర్శ

14. తెలుగు సాహిత్య విమర్శ - పరిచయం
15. విమర్శ-స్వరూప స్వభావాలు; ఉత్తమ విమర్శకుడు-లక్షణాలు



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc/B.A/B.Com General HINDI Syllabus (w.e.f:2020-21 A.Y)

UG(General HINDI)	Semester - II	Credits:03
Course : 2	Prose, Short Stories, Grammar and Letter Writing	Hrs/Weeks:04

Unit 1

गद्य संदेश (Prose) (सं. डा.वी.एलण्णरसिंहम शिवकोटि)

1. बिंदा
2. भारत एक है
3. एच.आई.वी/एड्स

Unit 2

कथा लोक (Short Stories) (सं. डा. धनश्याम)

1. मूख हडताल
2. परमात्मा का कुत्ता
3. और वह पढ गई...

Unit 3

व्याकरण (Grammar) (सरल हिन्दी व्याकरण, दक्षिण भारत हिन्दी प्रचार सभा, मद्रास)

संधि विच्छेद, वाक्यों की शुद्धि

Unit 4

कार्यालयीन हिंदी : पदनाम ... हिंदी से अंग्रेजी और अंग्रेजी से हिंदी

(Changing Administrative Terminology Hindi to English and English to Hindi)

Unit 5

पत्र लेखन : (Letter Writing)

नौकरी के लिए आवेदन पत्र

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ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc/B.A/B.Com/BBA.,etc., SANSKRIT Syllabus (w.e.f:2020-21 A.Y)

UG Courses	Semester - II	Credits:03
Course: 2	Poetry, Prose & Grammar	Hrs/Weeks:04

- UNIT – I OLD POETRY:**
- 1."Indumateeswayamvaram", Raghuvamsam of kalidasa, 6thcanto, Chowkhamba krishadas academy, Varanasi-2012.
 2. "Deekshaapradanam", Buddacharitam of Aswagosha, 16thcanto. Selected verses.
- UNIT – II MODERN POETRY:**
1. "Gangavataranam", Bhojas Champu Ramayanam, Balakanda.
 2. "Mohapanodaha", 4th cant. Dharma Souhrudam by P.Pattabhi Ramarao, , Published by Author, Ramanth Nagar.
 3. "VandeKasmeerabharatam", by Doolypala Ramakrishna from Samskrita pratibha, sahitya academy , New Delhi -2018.
- UNIT – III PROSE:**
1. "Avantisundarikatha", 5th Chapter. Dasakumara Charitam, Purva peetika.
 2. "Charudattacharitam", Bhasakathasaraha by Y.Mahalingasastry.
- UNIT - IV GRAMMAR:**
1. **DECLENSIONS** :Nouns ending in vowels
Nadee, Janu, vadhoo, Matru, Phala, Vaari & Madhu.
 2. **CONJUGATIONS**
III Conjugation- Yudh, IV Conjugation- Ish, VIII Conjugation- Likh, Kru, IX Conjugation-Kreen X, Conjugation-Kath, Ram, Vand.
- UNIT – V GRAMMAR:**
1. **SANDHI** - Halsandhi : Latva, Jastva
-Visarga sandhi: Utva, Visargalopa, Rephadesa, Ooshma.
 2. **SAMASA**
Avyayeebhava, Bahruvrihi.



UG- LIFE SKILL COURSE
INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (LS)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 hrs)
II	Life skill course	Information and Communication Technology (ICT)	30	2	2	50 Marks

Objectives: This course aims at acquainting the students with basic ICT tools which help them in their day to day and life as well as in office and research.

Course outcomes: After completion of the course, student will be able to;

- Understand the literature of social networks and their properties.
- Explain which network is suitable for whom.
- Develop skills to use various social networking sites like twitter, flickr, etc.
- Learn few GOI digital initiatives in higher education.
- Apply skills to use online forums, docs, spreadsheets, etc for communication, collaboration and research.
- Get acquainted with internet threats and security mechanisms.

UNIT-I: Fundamentals of Internet: What is Internet?, Internet applications, Internet Addressing – Entering a Web Site Address, URL–Components of URL, Searching the Internet, Browser–Types of Browsers, Introduction to Social Networking: Twitter, Tumblr, LinkedIn, Facebook, flickr, Skype, yahoo, YouTube, WhatsApp.

UNIT-II: E-mail: Definition of E-mail –Advantages and Disadvantages –User Ids, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management. G-Suite: Google drive, Google documents, Google spread sheets, Google Slides and Google forms.

UNIT-III: Overview of Internet security, E-mail threats and secure E-mail, Viruses and antivirus software, Firewalls, Cryptography, Digital signatures, Copyright issues. What are GOI digital initiatives in higher education? (SWAYAM, Swayam Prabha, National Academic Depository, National Digital Library of India, E-Sodh-Sindhu, Virtual labs, e-acharya, e-Yantra and NPTEL).

RECOMMENDED CO-CURRICULAR ACTIVITIES: Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/ independent and group learning.

1. Assignments (in writing and doing forms 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 (individual activity))
3. Quiz and Group Discussion
4. Slip Test
5. Try to solve MCQ's available online.
6. Suggested student hands on activities:
 - a. Create your accounts for the above social networking sites and explore them, establish a video conference using Skype.
 - b. Create an Email account for yourself- Send an email with two attachments to another friend. Group the email addresses use address folder.
 - c. Register for one online course through any of the online learning platforms like NPTEL, SWAYAM, Alison, Codecademy, Coursera. Create a registration form for your college campus placement through Google forms.

Reference Books:

1. In-line/On-line: Fundamentals of the Internet and the World Wide Web, 2/e –By Raymond Green law and Ellen Hepp, Publishers: TMH
2. Internet technology and Web design, ISRD group, TMH.
3. Information Technology – The breaking wave, Dennis P.Curtin, Kim Foley, Kunai Sen and Cathleen Morin, TMH.



UG- LIFE SKILL COURSE
INDIAN CULTURE AND SCIENCE(ICS)
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (LS)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam(2 Hrs)
II	Life skill course	Indian culture and science(ICS)	30	2	2	50 Marks

Learning Outcomes: By successful completion of the course, students will be able to:

- Understand the evolution of India's culture
- Analyze the process of modernization of Indian society and culture from past to future
- Comprehend objective education and evaluate scientific development of India in various spheres
- Inculcate nationalist and moral fervour and scientific temper

Unit – I: Unity in Diversity in India:

(09 hrs)

Coexistence of various religions since ancient times - Hinduism, Buddhism, Jainism and Atheism, and later Sikhism, Islam and Christianity The Bhakti (Vishnavite and Saivaite) and Sufi Movements. The concepts of seela, karuna, kshama, maitri, vinaya, santhi and ahimsa Achievements in Literature, Music, Dance, Sculpture and Painting - Craftsmanship in cloth, wood, clay, metal and ornaments Cultural diversity, Monogamy, Family system, Important seasonal festivals

Unit – II: Social Reforms and Modern Society:

(09 hrs)

Reforms by Basaveswara - Raja Rama Mohan Roy – Dayananda Saraswathi –Swamy Vivekananda –Mahatma Gandhi - B. R. Ambedkar - Reforms in Andhra by Vemana, Veerabrahmam, Gurajada, Veeresalingam and Gurrarn Jashua (only reforms in brief, biographies not needed). Modern Society: Family unity, Community service, Social Harmony, Civic Sense, Gender Sensitivity, Equality, National Fervor

Unit – III: Science and Technology:

(11 hrs)

Objectivity and Scientific Temper – Education on Scientific lines (Bloom's Taxonomy) - Online Education. Developments in Industry, Agriculture, Medicine, Space, Alternate Energy, Communications, Media through ages

Co-curricular Activities Suggested: Assignments, Group discussions, Quiz etc

1. Invited Lecture by a local expert
2. Visit to a scientific institutions, local heritage sites, museums, industries etc.

Reference Books:

1. History of India and Culture (Upto 1526 A.D), Telugu Academy
2. History of India and Culture (1526 A.D to 1964), Telugu Academy
3. Basham, A.L (ed), A Cultural History of India
4. Hana S. Noor Al-Deen&J.A.Hendricks, Social Media : Usage and Impact
5. Bipan Chandra, Aditya Mukherjee, Mridula Mukherjee, India After Independence
6. S.K.Thakur, ISRO: History and Achievements
7. V. Ramakrishna, Social Reform Movement Andhra, Vikas Publications



UG- SKILL DEVELOPMENT COURSE
SURVEY & REPORTING
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course	'A'	Survey & Reporting	30	2	2	50 Marks

Learning Outcomes:

After successful completion of this course, the student will be able to:

- Understand the basics of survey and reporting needs and methods
- Comprehend designing of a questionnaire
- Conduct a simple and valid survey and Collect data
- Organize and interpret data and Prepare and submit report.

Unit I: (08Hrs)

Survey: Meaning and Definition –Identifying need for survey - Identifying Sample –Characteristics of Sample - Types of Survey – Survey Methods – Advantages and Disadvantages of Survey – Essential Steps in Survey – Online Survey.

Unit II: (09Hrs)

Preparing Questionnaire: Types and Parts of Questionnaire – Qualities of good Questionnaire – Precautions in Preparing Questionnaire. Administering/Piloting Questionnaire –Collection of data - Dealing with People – Maintaining objectivity/neutrality.

Unit III: (10 Hrs): Methods of Organizing data – Forms of data presentation - Tables and Figures – Basic Statistical Methods of Analysis of data –Percentages - Mean, Mode and Median –Simple Ways of showing Results– Tables/Graphs/Diagrams

Report Writing: Forms of Reporting - Parts of a Report - Title page to Acknowledgements - Characteristics of a Good Report – Style of language to be used - Explaining Data in the Report – Writing fact-based Conclusions – making Recommendations – Annexing required material.

Recommended Co-curricular Activities (3 hrs):

1. Invited Lecture/Training by a Local Expert
2. Collection and study of questionnaires
3. Preparation of sample questionnaire and conduct a live sample survey
4. Preparation of a sample Report
5. Assisting a real time field survey and report writing
6. Assignments, Group discussion, Quiz etc.

Reference books:

1. Denscombe M., The Good Research Guide: For Small-Scale Social Research Projects, Open Uni. Press, 1998
2. Sudman S & Bradburn N.M., Asking Questions, 1973



UG- SKILL DEVELOPMENT COURSE
BUSINESS COMMUNICATION
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group 'A'	Course Title	Hrs/ Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course		Business Communication	30	2	2	50 Marks

Learning Outcomes:

After successful completion of this course, students will be able to;

- Understand the types of business communication and correspondence
- Comprehend the processes like receiving, filing and replying
- Acquire knowledge in preparing good business communications
- Acquaint with organizational communication requirements and presentations.

UNIT I:

(06hrs)

Introduction and Importance of communication an overview - meaning and process of communication - organizational communication and its barriers.

UNIT II:

(10hrs)

Types of Business Communications –Categories, methods and formats - Business vocabulary - Business idioms and collocations – Organisational Hierarchy - Various levels of communication in an organization – Top-down, Bottom-up and Horizontal-Business reports, presentations– Online communications.

UNIT III:

(10hrs)

Receiving business communications -Filing and processing -Sending replies. Routine cycle of communications – Writing Communications - Characteristics of a good business communication - Preparation of business meeting agenda – agenda notes - minutes –circulation of minutes – Presentations of communication using various methods.

Recommended Co-curricular Activities

(04hrs):

1. Collection of various model business letters
2. Invited lecture/field level training by a local expert
3. Reading of various business reports and minutes and its analysis
4. Presentations of reports, charts etc.
5. Assignments, Group discussion, field visit etc.

Reference books:

1. Chaturvedi. P.D.Chaturvedi.M - Business Communication concepts, Cases and applications - Pearsons Education.
2. Kaul Asha - Effective Business Communication - PHI Learning pvt Ltd .
3. www.swayam.gov.in
4. Websites on business communication



UG- SKILL DEVELOPMENT COURSE
SOCIAL WORK METHODS
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course	'B'	Social work Methods	30	2	2	50 Marks

Learning Outcomes: By successful completion of the course, students will be able to:

- Understand the basic concepts relating to social work practice, values, principles of social work and social problems in India
- List out different approaches of providing help to the people in need.
- Acquaint the process of primary methods of social work
- Get to know the skills of working with individuals, groups and communities.

Unit-I: (07Hrs)- Introduction to social work and concepts related to social work : Introduction to Social Work- Definition- Scope- objectives - Functions- social service, social welfare services, social reform, major social problems in India; Social work philosophy, values, objectives, principles, methods and fields of social work.

Unit-II: (09Hrs) Methods of Working with Individuals and Groups

Social case work –Definition-scope and importance of social case work, principles and process of social case work -Tools and techniques in social case work- Counselling skills.

Social Group Work-Definition-scope- the need for social group work –Group work process - Principles of Group Work -Stages of Group Work-Facilitation skills and techniques.

Unit-III: (09Hrs) Working with Communities and Field Work in social work

Community – definition - characteristics- types- community organisation as a method of social work-definition-objectives-principles- phases of community organization - 3 concepts of community development, community participation and community empowerment.

Field work in social work – Nature, objectives and types of field work - Importance of field work supervision.

Suggested Co-curricular Activities: (05 hours)

1. Divide the students into groups, each group containing not exceeding 10 students depending upon the total number of students in a class or section. Each group can search in internet about any one of the institutions which work for the welfare of children or women or elderly or scheduled caste and scheduled tribe children or differently abled persons or Juvenile homes or Correctional homes or hospitals or Mahila Pragathi pranganam or Swadhar project or any social welfare project or non governmental organizations (NGOs) to have an idea about welfare agencies working for the needy.
2. Ask each group to exchange and discuss the information with other groups in the classroom with the information they collected on Internet.
3. Group Discussion with the students- what type of community problems they observe in their villages/towns/cities? Ask them to tell what are the line departments which will help to solve the problems of their communities and suggest them what type strategies help the communities to empower.
4. Invited lectures/Training by local experts
5. Visit to a community
6. Assignments, Quiz etc.



Reference books:

1. Chowdhary, Paul. D. (1992). Introduction to Social Work. New Delhi: Atma Ram and Sons.
2. Friedlander W.A. (1955). Introduction to social welfare, New York, Prentice Hall.
3. Government of India, (1987). Encyclopedia of Social Work in India (Set of 4 Volumes). New Delhi, Publications Division, Ministry of Information and Broadcasting.
4. Lal Das, D.K. (2017). Practice of Social Research – Social Work Perspective, Jaipur, Rawat Publications.
5. Madan, G.R. (2009). Indian Social Problems (Volume 1 & 2). New Delhi: Allied publishers Private Limited.
6. Siddiqui, H.Y. (2007). Social Group Work. Jaipur: Rawat Publications
7. Pasty McCarthy & Carolin Hatcher, (2002). Presentation skills. The Essential Guide for Students. New Delhi, Sage Publications.
8. Websites on Social work methods.



UG- SKILL DEVELOPMENT COURSE

SOLAR ENERGY

(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course	'A'	Solar Energy	30	2	2	50 Marks

Learning Outcomes: After successful completion of the course, students will be able to:

- Acquire knowledge on solar radiation principles with respect to solar energy estimation.
- Get familiarized with various collecting techniques of solar energy and its storage
- Learn the solar photovoltaic technology principles and different types of solar cells for energy conversion and different photovoltaic applications.
- Understand the working principles of several solar appliances like Solar cookers, Solar hot water systems, Solar dryers, Solar Distillation, Solar greenhouses

UNIT-I – Solar Radiation:

(6 hrs)

Sun as a source of energy, Solar radiation, Solar radiation at the Earth's surface, Measurement of Solar radiation-Pyroheliometer, Pyranometer, Sunshine recorder, Prediction of available solar radiation, Solar energy-Importance, Storage of solar energy, Solar pond

UNIT-II – Solar Thermal Systems:

(10 hrs)

Principle of conversion of solar radiation into heat, Collectors used for solar thermal conversion: Flat plate collectors and Concentrating collectors, Solar Thermal Power Plant, Solar cookers, Solar hot water systems, Solar dryers, Solar Distillation, Solar greenhouses.

UNIT-III – Solar Photovoltaic Systems:

(10 hrs)

Conversion of Solar energy into Electricity - Photovoltaic Effect, Solar photovoltaic cell and its working principle, Different types of Solar cells, Series and parallel connections, Photovoltaic applications: Battery chargers, domestic lighting, street lighting and water pumping

Co-curricular Activities (Hands on Exercises):

(04 hrs)

[Any four of the following may be taken up]

1. Plot sun chart and locate the sun at your location for a given time of the day.
2. Analyse shadow effect on incident solar radiation and find out contributors.
3. Connect solar panels in series & parallel and measure voltage and current.
4. Measure intensity of solar radiation using Pyranometer and radiometers.
5. Construct a solar lantern using Solar PV panel (15W)
6. Assemble solar cooker
7. Designing and constructing photovoltaic system for a domestic house requiring 5kVA power
8. Assignments/Model Exam.

Reference Books:

1. Solar Energy Utilization, G. D. Rai, Khanna Publishers
2. Solar Energy- Fundamentals, design, modeling& applications, G.N. Tiwari, Narosa Pub., 2005.
3. Solar Energy-Principles of thermal energy collection & storage, S.P. Sukhatme, Tata Mc-Graw Hill Publishers,1999.
4. Solar Photovoltaics- Fundamentals, technologies and applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.,
5. Science and Technology of Photovoltaics, P. Jayarama Reddy, BS Publications, 2004.



AGRICULTURAL MARKETING

(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group 'A'	Course Title	Hrs/ Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course		Agricultural Marketing	30	2	2	50 Marks

Learning Outcomes:

By the successful completion of this course, the student will be able to;

- Know the kinds of agricultural products and their movement
- Understand the types, structure and functioning of agricultural marketing system
- Comprehend related skills and apply them in sample situations
- Extend this knowledge and skills to their production/consumption environment

Unit- I:

(06hrs)

Introduction of Agriculture and agricultural products (including agriculture, horticulture, sericulture, floriculture, aquaculture- genetic culture and dairy product) - Agricultural Marketing - Role of marketing - Concepts - Goods and services - Movement of product from farm to consumer –Middlemen – Moneylenders - Types of agricultural markets (basic classification).

Unit- II:

(09hrs)

Basic structure and facilities of an agricultural market – Primary, secondary and tertiary markets– Functioning of Market Yards–Market information – Rythu Bharosa Kendras (RBK) – Govt market policies and regulations- Contract farming -Govt Apps for marketing of agri products.

Unit- III:

(10hrs)

Planning production – assembling – grading - transportation- storage facilities. Price fixation. Dissemination of market information –and role of ICT. Marketing - Mix- Product element- Place element- Price element- Promotion element. Selection of target market. Government programs in support of Agricultural marketing in India.

Suggested Co-curricular Activities:

(05hrs)

1. Study visit to agricultural markets and Rythu Bharosa Kendras (RBK)
2. Invited lecture by field expert
3. Survey of various involved activities e.g.assembling, grading, storage, transportation and distribution
4. Identify the demand for food processing units
5. Application of Govt Apps as one Nation and one Market
6. Assignments, Group discussion, Quiz etc.

Reference books:

1. S.S.Acharya & N.L.Agarwala, Agricultural Marketing in India - Oxford and IBH Publications
2. K.S.Habeeb - Ur - Rahman Rural Marketing in India - Himalaya publishing
3. S.S.Chinna Agricultural Marketing in India - KALYANI publishers
4. Publications of National Institute of Agricultural Marketing, Odisha
5. Wikipedia and other websites on Agricultural Marketing.



UG- SKILL DEVELOPMENT COURSE
ADVERTISING
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course	'B'	Advertising	30	2	2	50 Marks

Learning Outcomes:

After Successful completion of this course, the students are able to;

- Understand the field of Advertising
- Comprehend opportunities and challenges in Advertising sector
- Prepare a primary advertising model
- Understand applying of related skills
- Examine the scope for making advertising a future career

UNIT I:

(06hrs)

Introduction of advertising concepts- functions - Types of advertising - Creative advertising messages - Factors determining opportunities of a product/service/idea

UNIT II:

(10 hrs)

Role of advertising agencies and their responsibilities - scope of their work and functions - - Ethical issues - Identifying target groups -Laws in advertising. Advertising Statutory Bodies in India - Role of AAAI (Advertising Agencies Association of India), ASCI (Advertising Standard Council of India)

UNIT III:

(10hrs)

Types of advertising – Basic characteristics of a typical advertisement –Reaching target groups - Local advertising – Feedback on impact of advertisement - Business promotion.

Recommended Co-curricular Activities:

(04 hrs)

1. Collection and segmentation of advertisements
2. Invited Lectures/skills training on local advertising basics and skills
3. Visit to local advertising agency
4. Model creation of advertisements in compliance with legal rules
5. Assignments, Group discussion, Quiz etc.

Reference books:

1. Bhatia. K.Teja - Advertising and Marketing in Rural India - Mc Millan India
2. Ghosal Subhash - Making of Advertising - Mc Millan India
3. JethwaneyJaishri& Jain Shruti - Advertising Management - Oxford university Press Publications of Indian Institute of Mass Communications
4. Websites on Advertising



UG- SKILL DEVELOPMENT COURSE

DAIRY TECHNOLOGY

(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course	'B'	Dairy Technology	30	2	2	50 Marks

Learning Outcomes:

After successful completion of the course, students will be able to;

- Understand the pre-requisites for starting a Dairy farm
- Recognize different breeds of Cows & buffaloes following safety precautions.
- Prepare and give recommended feed and water for livestock
- Maintain health of livestock along with productivity
- Vaccination of cattle, nutrients requirements
- Entrepreneurship i.e., Effectively market dairy products
- Ensure safe and clean dairy farm and Standard safety measures to be taken Efficiently start and manage to establish or develop a Dairy Industry

Unit- I (Introduction and Establishment of a Dairy Farm): (05 Hrs)

- 1.1 Dairy development in India – Dairy Cooperatives (NDRI, NDDB, TCMPI) (1hr)
- 1.2 Constraints of Present Dairy Farming and Future Scope of Dairy Farmer. (1 hr)
- 1.3 Selection of site for dairy farm; Systems of housing – Loose housing system, Conventional Dairy Farm; Records to be maintained in a dairy farm. (2 hrs)

Unit - II (Livestock Identification and Management): (13 Hrs)

- 2.1 Breeds of Dairy Cattle and Buffaloes – Identification of Indian cattle and buffalo breeds and Exotic breeds; Methods of selection of Dairy animals. (5 hrs)
- 2.2 Systems of inbreeding and crossbreeding. (2 hrs)
- 2.3 Weaning of calf, Castration, Dehorning, Deworming and Vaccination programme (3 hrs)
- 2.4 Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.(3 hrs)

Unit- III (Feed Management, Dairy Management, Cleaning and Sanitation): (8 Hrs)

- 3.1 Basic Principles of Feed, Important Feed Ingredients, Feed formulation and Feed Mixing (2 hrs)
- 3.2 Operation Flood –Definition of Milk and Nutritive value of milk and ICMR recommendation of nutrients –Per Capita Milk production and availability in India and Andhra Pradesh – Methods of Collection and Storage of Milk–Labelling and Storage of milk products (4 hrs)
- 3.3 Cleaning and sanitation of dairy farm – Safety precautions to prevent accidents in an industry. (2 hrs)

Co-curricular Activities Suggested: (4 hrs)

1. Group discussion & SWOT analysis
2. Visit to a Dairy Farm
3. Visit to Milk Cooperative Societies
4. Visit to Feed Milling Plants
5. Market Study and Identification of Government Schemes, Insurance and Bank Loans in relation

Reference books:

1. Dairy Science: Petersen (W.E.) Publisher – Lippincott & Company
2. Principles and practices of Dairy Farm –Jagdish Prasad
3. Text book of Animal Husbandry - G C Benarjee
4. Hand book of Animal Husbandry - ICAR Edition
5. Outlines of Dairy Technology – Sukumar (De) – Oxford University press
6. Indian Dairy Products – Rangappa (K.S.) & Acharya (KT) – Asia Publishing House.
7. The technology of milk Processing – Ananthkrishnan, C.P., Khan, A.Q. and Padmanabhan, P.N. – Shri Lakshmi Publications.
8. Dairy India 2007, Sixth edition
9. Economics of Milk Production – Bharati Pratima Acharya Publishers.
10. <http://www.asci-india.com/BooksPDF/Dairy%20Farmer%20or%20Entrepreneur.pdf>
11. <https://labour.gov.in/industrial-safety-health>



UG- SKILL DEVELOPMENT COURSE
PERFORMING ARTS
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Group 'B'	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course		Performing Arts	30	2	2	50 Marks

Learning Outcomes:

After successful completion of this course, the student will be able to:

- Acquire the basic knowledge in performing arts
- Understand the modern stage and performance on the stage
- Comprehend and improve the skills related to performing arts on the stage
- Understand various Telugu folk arts and their significance
- Know the modes of presentation and skills pertaining to folk arts.

Unit-I: Introduction to performing Arts

(06 Hrs)

Arts – and its definition; Fine Arts; Arts - Learning & Imitation – Rasaas, Bhaavas and Rasa Sutra, Dasaropakaas; Nritha, Nrithya, Natya; Action – Kinds of Actions; Ancient Costume style

Unit-II: Performing Arts – Stage Arts

(10 Hrs)

Origin of Drama (Theatre); Features of Stage; Varieties of Modern Telugu Drama; Famous Telugu Dramas. Stage performance; Dramatic Actor and its definition; Actor-characteristics, Functions and Responsibilities. Traits of an Actor – Diction, Articulation, Dialogue modulation, Time sense, Observation, Mime, Improvisation, Commentary, Dress code, Make-up, lighting & Stage Direction.

Unit-III: Performing Arts – Forms

(10 Hrs)

Folk Arts, their nature and significance – Brief introduction to Pagativeshalu, Bommalaatalu, Veedhinaatakaalu, Yakshagaanaalu, Harikathalu, Burrakathalu, Oggukathalu, Chindu, Yakshaganam, Kolaatamand Pulivesham.

Co-curricular Activities Suggested:

(4 hrs)

1. Collection of information on modern stage plays, natakasamajams and audio visual material.
2. Providing training classes/inviting lectures with the help of local artists
3. Visit to a real time performing folk arts, if possible.
4. Mock experience classes of Stage plays and Folk arts.
5. Assignments, Group discussion, Quiz etc.

Reference books:

1. Andhra Naataka Ranga Charithra –Mikkilineni Radha Krishna Murthy
2. Telugu Sahithya Sameeksha (Vol-II) – Dr. G. Nagaiah
3. Telugu Naataka Vilaasam – Dr.P.S.Rappa Rao
4. Telugu Jaanapada Vignanam – Prof. Tangirala Venkata Subba Rao
5. Jaanapada Vignandhyayanam – Prof. G.S. Mohan
6. Naatya Sasthramu (Visleshanathmaka Adhyayanam) – Dr.P.S.Rappa Rao
7. Sahithya Silpa Sameeksha – Prof. Pingali Lakshmikantham
8. Nurella Telugu Nataka Rangam – Prof. Modali Nagabhushana Sarma
9. Websites on Performing Arts.



B. Sc	Semester: II	Credits:4
Course: 2	DATA MINING CONCEPTS AND TECHNIQUES	Hrs/Wk: 4

Aim and objectives of Course:

- To understand Data mining techniques and algorithms.
- Comprehend the data mining environments and application.

Learning outcomes of Course

Students who complete this course will be able to

- Compare various conceptions of data mining as evidenced in both research and application.
- Evaluate mathematical methods underlying the effective application of data mining.
- Should be able to apply the type of techniques based on the problems considered

UNIT I:

An idea on Data Warehouse, Data mining-KDD versus data mining, Stages of the Data Mining Process-Task primitives., Data Mining Techniques – Data mining knowledge representation.

UNIT II

Data mining query languages- Integration of Data Mining System with a Data Warehouse- Issues, Data pre-processing – Data Cleaning, Data transformation – Feature selection – Dimensionality reduction

UNIT III

Concept Description: Characterization and comparison What is Concept Description, Data Generalization by Attribute-Oriented Induction(AOI), AOI for Data Characterization, Efficient Implementation of AOI.

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori method, generating Association Rules, Improving the Efficiency of Apriori, Pattern-Growth Approach for mining Frequent Item sets.

UNIT-IV

Classification Basic Concepts: Basic Concepts, Decision Tree Induction: Decision Tree Induction Algorithm, Attribute Selection Measures, Tree Pruning. Bayes Classification Methods.

UNIT-V

Classification by Back Propagation: Multi_Layer Feed Forward Neural Network. Support Vector Machines: Cases when the data are linearly separable and linearly inseparable.

Cluster Analysis: Cluster Analysis, Partitioning Methods, Hierarchical methods, Density based methods-DBSCAN.

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber, Jian Pei. "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kaufmann Publishers, 2011.
2. Adelchi Azzalini, Bruno Scapa, "Data Analysis and Data mining" , 2nd Edition, Oxford University Press Inc., 2012.

REFERENCES BOOKS:

1. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", 10th Edition, Tata McGraw Hill Edition , 2007.
2. G.K. Gupta, "Introduction to Data Mining with Case Studies", 1st Edition, Eastern Economy Edition, PHI, 2006.



Student Activities:

1. Students should be able to implement Data Mining algorithms provided the relevant data
2. Given the data, students can visualize all statistical measures
3. Differentiate the types of mining problems and identify what type of algorithms are to be implemented.

Continuous assessment:

Let the students be tested in the following questions from each unit

1. What is Data Mining and KDD? Where Data Mining fits in KDD Process
2. Describe all Preprocessing methods
3. Explain Data Description and AOI Algorithm
4. Explain Classification and Write any Decision tree induction algorithm
5. Explain the concept of clustering and write any algorithm to form clusters.



B. Sc	Semester: II	Credits:1
Course: 2	DATA MINING CONCEPTS AND TECHNIQUES LAB	Hrs/Wk: 2

1. Get and Clean data using swirl exercises.(Use 'swirl' package, library and install that topic from swirl).
2. Visualize all Statistical measures(Mean ,Mode, Median, Range, Inter Quartile Range etc., using Histograms, Boxplots and Scatter Plots).
3. Create a data frame with the following structure.

EMP ID	EMP NAME	SALARY	START DATE
1	Satish	5000	01-11-2013
2	Vani	7500	05-06-2011
3	Ramesh	10000	21-09-1999
4	Praveen	9500	13-09-2005
5	Pallavi	4500	23-10-2000

- a. Extract two column names using column name.
 - b. Extract the first two rows and then all columns.
 - c. Extract 3rd and 5th row with 2nd and 4th column.
4. Create a data frame with 10 observations and 3 variables and add new rows and columns to it using 'rbind' and 'cbind' function.
 5. Create a function to discretize a numeric variable into 3 quantiles and label them as low, medium, and high. Apply it on each attribute of any dataset to create a new data frame. 'discrete' with Categorical variables and the class label.
 6. Create a simple scatter plot using any dataset using 'dplyr' library. Use the same data to indicate distribution densities using box whiskers.
 7. Write R Programs to implement k-means clustering, k-medoids clustering and density based clustering on any datasets.
 8. Write a R Program to implement decision trees using 'reading Skills' dataset.
 9. Implement decision trees using any dataset using package party and 'rpart'.
 10. Train SVM Model by taking any dataset.



B. Sc	Semester: II	Credits: 4
Course: 2	PROBABILITY AND PROBABILITY DISTRIBUTIONS	Hrs/Wk: 4

Course Learning Outcomes:

Students will acquire:

- ability to distinguish between random and non-random experiments,
- knowledge to conceptualize the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem,
- knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments,
- knowledge of important discrete and continuous distributions such as Binomial, Poisson, Geometric, Negative Binomial and Hyper-geometric, normal, uniform, exponential, beta and gamma distributions,
- acumen to apply standard discrete and continuous probability distributions to different situations.

UNIT I:

Introduction to Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events. Boole's inequality and Baye's theorem and its applications in real life problems.

UNIT II:

Random variable: Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. For given pmf, pdf calculation of moments, coefficient of skewness and kurtosis. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

UNIT III:

Mathematical expectation : Mathematical expectation of a random variable and function of a random variable. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F and their properties. Chebyshev and Cauchy - Schwartz inequalities.

UNIT IV:

Discrete Distributions: Binomial, Poisson, Negative Binomial, Geometric distributions: Definitions, means, variances, M.G.F, C.F, C.G.F, P.G.F, additive property if exists. Poisson approximation to Binomial distribution. Hyper-geometric distribution: Definition, mean and variance.

UNIT V:

Continuous Distributions: Rectangular, Exponential, Gamma, Beta Distributions: mean, variance, M.G.F, C.G.F, C.F. Normal Distribution: Definition, Importance, Properties, M.G.F, CF, additive property.



TEXT BOOKS:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

REFERENCE BOOKS:

1. Willam Feller: Introduction to Probability theory and its applications. Volume -I, Wiley
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishinghouse.
4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
5. Sanjay Arora and Bansil Lal: New Mathematical Statistics: Satya Prakashan , New Delhi
6. Hogg Tanis Rao: Probability and Statistical Inference. 7th edition. Pearson.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f.2020-21 A.Y)

B. Sc	Semester: II	Credits: 1
Course: 2(L)	Practical	Hrs/Wk: 2

List of Experiments:

1. Fitting of Binomial distribution – Directmethod.
2. Fitting of binomial distribution – Recurrence relationMethod.
3. Fitting of Poisson distribution – Directmethod.
4. Fitting of Poisson distribution - Recurrence relationMethod.
5. Fitting of Negative Binomialdistribution.
6. Fitting of Geometricdistribution.
7. Fitting of Normal distribution – Areasmethod.
8. Fitting of Normal distribution – Ordinatesmethod.
9. Fitting of Exponentialdistribution.

Note: Training shall be on establishing formulae in Excel cells and derive the results. The exceloutput shall be exported to MS word for writing inference.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester: II	Credits: 4
Course: 2	DATA STRUCTURES USING C	Hrs/Wk: 4

Aim and objectives of Course:

- To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

Learning outcomes of Course:

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

- Understand available Data Structures for data storage and processing.
- Comprehend Data Structure and their real-time applications - Stack, Queue, Linked List, Trees and Graph
- Choose a suitable Data Structures for an application
- Develop ability to implement different Sorting and Search methods
- Have knowledge on Data Structures basic operations like insert, delete, search, update and traversal
- Design and develop programs using various data structures
- Implement the applications of algorithms for sorting, pattern matching etc

Detailed Syllabus: (Five units with each unit having 12 hours of class work)

UNIT I:

Introduction to Data Structures: Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Types, Data Types, and Data Structures, Refinement Stages.

Principles of Programming and Analysis of Algorithms: Software Engineering, Program Design, Algorithms, Different Approaches to Designing an Algorithm, Complexity, Big 'O' Notation, Algorithm Analysis, Structured Approach to Programming, Recursion, Tips and Techniques for Writing Programs in 'C'.

UNIT II:

Arrays: Introduction to Linear and Non- Linear Data Structures, One- Dimensional Arrays, Array Operations, Two- Dimensional arrays, Multidimensional Arrays, Pointers and Arrays, an Overview of Pointers.

Linked Lists: Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Atomic Linked List, Linked List in Arrays, Linked List versus Arrays.

UNIT III:

Stacks: Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion.

Queues: Introduction, Queue as an Abstract data Type, Representation of Queues, Circular Queues, Double Ended Queues- Deques, Priority Queues, Application of Queues.

UNIT IV:

Binary Trees: Introduction to Non- Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Counting Number of Binary Trees, Applications of Binary Tree.

UNIT V:

Searching and sorting: Sorting – An Introduction, Bubble Sort, Insertion Sort, Merge Sort, Searching – An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs.

TEXT BOOKS:

1. "Data Structures using C", ISRD group Second Edition, TMH
2. "Data Structures through C", Yashavant Kanetkar, BPB Publications

REFERENCES:

1. "Data Structures Using C" Balagurusamy E. TMH



B Sc	Semester: II	Credits: 1
Course: 2(L)	DATA STRUCTURES USING C Lab	Hrs/Wk: 2

Details of Lab Syllabus: **Data Structures Using C Lab**

- a. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
 - i. Add an element at the beginning of an array
 - ii. Insert an element at given index of array
 - iii. Update a element using a values and index
 - iv. Delete an existing element
- b. Write a program using stacks to convert a given
 - i. postfix expression to prefix
 - ii. prefix expression to postfix
 - iii. infix expression to postfix
- c. Write Programs to implement the Stack operations using an array
- d. Write Programs to implement the Stack operations using Linked List.
- e. Write Programs to implement the Queue operations using an array.
- f. Write Programs to implement the Queue operations using Linked List.
- g. Write a program for arithmetic expression evaluation.
- h. Write a program for Binary Search Tree Traversals
- i. Write a program to implement dequeue using a doubly linked list.
- j. Write a program to search an item in a given list using the following Searching Algorithms
 - i. Linear Search
 - ii. Binary Search.
- k. Write a program for implementation of the following Sorting Algorithms
 - i. Bubble Sort
 - ii. Insertion Sort
 - iii. Quick Sort
- l. Write a program for polynomial addition using single linked list
- m. Write a program to find out shortest path between given Source Node and DestinationNode in a given graph using Dijkstra's algorithm.
- n. Write a program to implement Depth First Search graph traversals algorithm
- o. Write a program to implement Breadth First Search graph traversals algorithm



RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms 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 (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

B. General

1. Group Discussion
2. Try to solve MCQ's available online.
3. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted;

- p. The oral and written examinations (Scheduled and surprise tests),
- q. Closed-book and open-book tests,
- r. Problem-solving exercises,
- s. Practical assignments and laboratory reports,
- t. Observation of practical skills,
- u. Individual and group project reports like "Creating Text Editor in C".
- v. Efficient delivery using seminar presentations,
- w. Viva voce interviews.
- x. Computerized adaptive testing, literature surveys and evaluations,
- y. Peers and self-assessment, outputs form individual and collaborative work.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc/B.A/B.Com/BCA/BBM,etc. ENGLISH Syllabus (w.e.f:2020-21 A.Y)

UG(English)	Semester -III	Credits: 03
Course - 3	A Course In Conversational Skills	Hrs/Week: 04

Learning Outcomes

By the end of the course the learner will be able to :

- Speak fluently in English
- Participate confidently in any social interaction
- Face any professional discourse
- Demonstrate critical thinking
- Enhance conversational skills by observing the professional interviews.

UNIT I:

Speech : 1. Tryst with Destiny Jawaharlal Nehru

Skills : 2. Greetings
: 3. Introductions

UNIT II:

Speech : 1. Yes, We Can Barack Obama

Interview : 2. A Leader Should Know How to Manage Failure Dr.A.P.J.Abdul Kalam/ India
Knowledge at Wharton

Skills : 3. Requests

UNIT III:

Interview : 1. Nelson Mandela's Interview With Larry King

Skills : 2. Asking and Giving Information
: 3. Agreeing and Disagreeing

UNIT IV:

Interview : 1. JRD Tata's Interview With T.N.Ninan

Skills : 2. Dialogue Building
: 3. Giving Instructions/Directions

UNIT V:

1. **Speech :** 1. You've Got to Find What You Love Steve Jobs

Skills : 2. Debates
: 3. Descriptions
: 4. Role Play



పాఠ్య ప్రణాళిక

యూనిట్-I: వ్యక్తీకరణ నైపుణ్యాలు

1. భాష-ప్రాథమికాంశాలు: భాష-నిర్వచనం, లక్షణాలు, ఆపశ్యకత, ప్రయోజనాలు
2. వర్ణం-పదం-వాక్యం', వాక్య లక్షణాలు, సామాన్య-సంయుక్త-సంశ్లిష్టవాక్యాలు
3. భాషా నిర్మాణంలో 'వర్ణం-పదం-వాక్యం' ప్రాధాన్యత

యూనిట్-II సృజనాత్మక రచన

4. కవితా రచన : ఉత్తమ కవిత - లక్షణాలు
5. కథారచన : ఉత్తమ కథ - లక్షణాలు
6. వ్యాస రచన : ఉత్తమ వ్యాసం-లక్షణాలు

యూనిట్-III: అనువాద రచన

7. అనువాదం-నిర్వచనం, అనువాద పద్ధతులు,
8. అనువాద సమస్యలు-భౌగోళిక,భాషా,సాంస్కృతిక సమస్యలు, పరిష్కారాలు
9. అభ్యాసము : ఆంగ్లం నుండి తెలుగుకు,తెలుగు నుండి ఆంగ్లానికి ఒక పేరానుఅనువదించడం

యూనిట్ IV మాధ్యమాలకు రచన-1 (ముద్రణామాధ్యమం/ప్రింట్ మీడియా)

10. ముద్రణామాధ్యమం (అచ్చుమాధ్యమం) : పరిచయం, పరిధి, వికాసం
11. వివిధ రకాల పత్రికలు-పరిశీలన, పత్రికాభాష, శైలి, వైవిధ్యం
12. పత్రికా రచన : వార్తా రచన, సంపాదకీయాలు, సమీక్షలు-అవగాహన

యూనిట్ V మాధ్యమాలకు రచన-2 (ప్రసార మాధ్యమం/ఎలక్ట్రానిక్ మీడియా)

13. ప్రసారమాధ్యమాలు : నిర్వచనం, రకాలు, విస్తృతి, ప్రయోజనాలు
14. శ్రవణ మాధ్యమాలు - రచన: రేడియో రచన, ప్రసంగాలు, నాటికలు, ప్రసార సమాచారం
15. దృశ్యమాధ్యమాలు - రచన: వ్యాఖ్యానం (యాంకరింగ్), టెలివిజన్ రచన



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc/B.A/B.Com General HINDI Syllabus (w.e.f.2020-21 A.Y)

UG(General HINDI)	Semester III	Credits:03
Course : 3	Old and Modern Poetry, History of Hindi Literature ,Essays (Translation and Functional Hindi)	Hrs/Weeks:04

Unit 1

1. काव्यदीप (Ancient and Modern Poetry) (सं.बी.राधाकृष्णमूर्ति)

साखी...1-10 दोहे

सूरदास...बाल वर्णन

मातृभूमि...मैथिलीशरण गुप्त

तोडती पत्थर...सूर्यकांत त्रिपाठी निराला

भारतमाता...सुमित्रानंदन पंत

Unit 2

2. हिंदी साहित्य का इतिहास (History of Hindi Literature) (डा. बाबू गुलाबराय)

हिंदी साहित्य का काल विभाजन (डा. रामचन्द्र शुक्ल)

भक्तिकाल की विशेषताएँ

ज्ञानाश्रयी शाखा ... कबीर

प्रेमाश्रयी शाखा ... जायसी

Unit 3

3. निबंध (General Essays)

1.समाचार पत्र

2.बेकारी समस्या

3.पर्यावरण और प्रदूषण

4. साहित्य और समाज

Unit 4

4. अनुवाद (Translation) अंग्रेजी से हिंदी (Five Simple Sentences)

Unit 5

5. प्रयोजनमूलक हिंदी (Functional Hindi)

राष्ट्रभाषा, राजभाषा, संपर्क भाषा

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ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc/B.A/B.Com/BBA.,etc., SANSKRIT Syllabus (w.e.f:2020-21 A.Y)

UG Courses	Semester - III	Credits:03
Course: 3	Drama, Upanishad, Alankara and History of Literature.	Hrs/Weeks:04

UNIT – I : OLD DRAMA

- 1.“Madhyamavyayogaha”. Bhasa Natakachakram.
krishadas academy, Varanasi 1998.

UNIT – II :MODERN DRAMA

- “Sankalpabalam” by Prof.G.S.R.Krishna Murthy,
Published by Semushi, R.S.Vidyapeetam, Tirupati-2019.

UNIT – III :UPANISHAD

- 1.“Sishyanusasanam” – Sikshavalli of Taittireeyopanishad.
2. “Sraddatrayavibhagayoga”,
17th Chapter, Bhagavadgita, Geetapress, Gorakhpur.

UNIT - IV : 1. ALANKARAS:

1. Upama 2. Ananvaya 3. Utpreksha 4. Deepakam
5. Aprastutaprasamsa 6.Drushtanta 7. Prateepa.

2.HISTORY OF SANSKRIT LITERATURE

- 1.Panini 2.Kautilya 3.Bharatamuni 4. Bharavi 5.Magha
6.Bhavabhuti 7. Sankaracharya, 8.Jagannatha. 9. Dandi.

UNIT – V : HALANTA SABDAS

- 1.Jalamuch 2.Vaach 3.Marut 4.Bhagavat 5.Bhavat
6.Pachats 7. Naman 8.Rajan 9.Gunin 10.Vidwas 11. Manas.



UG- LIFE SKILL COURSE
ENVIRONMENTAL EDUCATION (EE) (Mandatory)
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (LS)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
III	Life skill course	Environmental Education(EE)	30	2	2	50 Marks

Course objective: A Generic Course intended to create awareness that the life of human beings is an integral part of environment and to inculcate the skills required to protect environment from all sides.

Learning outcomes: On completion of this course the students will be able to

- Understand the nature, components of an ecosystem and that humans are an integral part of nature.
- Realize the importance of environment, the goods and services of a healthy biodiversity, dependence of humans on environment.
- Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenic activities.
- Discuss the laws/ acts made by government to prevent pollution, to protect biodiversity and environment as a whole.
- Acquaint with international agreements and national movements, and realize citizen's role in protecting environment and nature.

Unit 1: Environment and Natural Resources: (06hrs)

1. Multidisciplinary nature of environmental education; scope and importance.
2. Man as an integral product and part of the Nature.
3. A brief account of land, forest and water resources in India and their importance.
4. Biodiversity: Definition; importance of Biodiversity - ecological, consumptive, productive, social, ethical and moral, aesthetic, and option value.
5. Levels of Biodiversity: genetic, species and ecosystem diversity.

Unit-2: Environmental degradation and impacts: (10hrs)

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (within India).
3. Deforestation: Causes and effects due to expansion of agriculture, firewood, mining, forest fires and building of new habitats.
4. Non-renewable energy resources, their utilization and influences.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economic risks.
6. Green house effect - global warming; ocean acidification, ozone layer depletion, acid rains and impacts on human communities and agriculture.
7. Threats to biodiversity: Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control.

Unit 3: Conservation of Environment: (10hrs)

Concept of sustainability and sustainable development with judicious use of land, water and forest resources; a forestation.

1. Control measures for various types of pollution; use of renewable and alternate sources of energy.
2. Solid waste management: Control measures of urban and industrial waste.
3. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
4. Environment Laws: Environment Protection Act; Act; Wildlife Protection Act; Forest Conservation Act.
5. International agreements: Montreal and Kyoto protocols; Environmental movements: Bishnois of Rajasthan, Chipko, Silent valley.



Suggested activities to learner: (4 hours)

1. Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc
2. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural site.
3. Study of common plants, insects, birds and basic principles of identification.
4. Study of simple ecosystems- forest, tank, pond, lake, mangroves etc.
5. Case study of a Forest ecosystem or a pond ecosystem.

Suggested text book:

- ¹ Erach Barucha (2004) *Text book of Environmental Studies for Undergraduate courses* (Prepared for University Grants Commission) Universities Press.
- ² Purnima Smarath (2018) *Environmental studies* Kalyani Publishers, Ludhiana

Reference books:

1. Odum, E.P., Odum, H.T. & Andrews, J. (1971) *Fundamentals of Ecology*. Philadelphia: Saunders.
2. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. (2011). *Environmental and Pollution Science*. Academic Press.
3. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. (2012) *Environment, 8th edition*. John Wiley & Sons.
4. Singh, J.S., Singh, S.P. and Gupta, S.R. (2014) *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
5. Sengupta, R. (2003) *Ecology and economics: An approach to sustainable development*. OUP.
6. Wilson, E. O. (2006) *The Creation: An appeal to save life on earth*. New York: Norton.
7. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll (2006) *Principles of Conservation Biology*. Sunderland: Sinauer Associates.



UG- LIFE SKILL COURSE
PERSONALITY ENHANCEMENT AND LEADERSHIP (PDL)
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (LS)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam(2 Hrs)
III	Life skill course	Personality enhancement and leadership(PDL)	30	2	2	50 Marks

Learning Outcomes:

By successful completion of the course, students will be able to:

- Develop comprehensive understanding of personality
- Know how to assess and enhance one's own personality
- Comprehend leadership qualities and their importance
- Understand how to develop leadership qualities

Unit – I:

(7 hrs)

Meaning of Personality – Explanations of Human Personality – Psychodynamic Explanations – Social Cognitive Explanation – Big Five traits of Personality

Unit – II:

(8 hrs)

Assessment of Personality - Projective& Self Report Techniques - Building Self-Confidence – Enhancing Personality Skills

Unit – III:

(10 hrs)

Leadership Characteristics – Types of Leaders – Importance of Leadership – Leadership Skills – Building and Leading Efficient Teams – Leadership Qualities of Abraham Lincoln, Mahatma Gandhi, Prakasam Pantulu, Dr. B. R. Ambedkar & J.R.D.Tata

Co-curricular Activities Suggested:

(05 hrs)

- Assignments, Group discussions, Quiz etc
- Invited Lecture by a local expert
- Case Studies (ex., on students behavior, local leaders etc.)

Reference Books:

1. Girish Batra, Experiments in Leadership, Chennai: Notion Press, 2018
2. Mitesh Khatri, Awaken the Leader in You, Mumbai: Jaico Publishing House, 2013
3. Carnegie Dale, Become an Effective Leader, New Delhi: Amaryllis, 2012
4. Hall, C.S., Lindzey. G. & Campbell, J.B Theories of Personality. John Wiley & Sons,1998



UG- LIFE SKILL COURSE
ANALYTICAL SKILLS(AS)
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (LS)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
III	Life skill course	Analytical skills(AS)	30	2	2	50 Marks

Course Objective: Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

Course Outcomes:

After successful completion of this course, the student will be able to;

- Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.
- Acquire competency in the use of verbal reasoning.
- Apply the skills and competencies acquired in the related areas
- Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

UNIT – 1: (10 Hrs)

Arithmetic ability: Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD(HCF).

Verbal Reasoning: Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

UNIT – 2: (10 Hrs)

Quantitative aptitude: Averages, Ratio and proportion, Problems on ages, Time-distance–speed.

Business computations: Percentages, Profit & loss, Partnership, simple compound interest.

UNIT – 3: (07 Hrs)

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, line Graphs. Venn diagrams.

Recommended Co-Curricular Activities (03 Hrs)

Surprise tests / Viva-Voice / Problem solving/Group discussion.

Text Book:

Quantitative Aptitude for Competitive Examination by R.S. Agrawal, S.Chand Publications.

Reference Books:

1. Analytical skills by Showick Thorpe, published by S Chand And Company Limited, Ramnagar, New Delhi-110055.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw Hill Publications.



UG- SKILL DEVELOPMENT COURSE
DISASTER MANAGEMENT
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
III	Skill Development Course	Disaster Management	30	2	2	50 Marks

Learning Outcomes:

After successful completion of the course, the students are able to;

- Understand the nature, cause and effects of disasters
- Comprehend the importance of Disaster Management and the need of awareness
- Acquire knowledge on disaster preparedness, recovery remedial measures and personal precautions
- Volunteer in pre and post disaster management service activities

UNIT-I:

(06 hrs)

Introduction of Disaster - Different types of disasters- Natural- (flood, cyclone, earthquake, famine and pandemic) - Accidental- (Fire, Blasting, Chemical leakage, Rail, Aviation, Road boat tragedies and nuclear pollution) - Disaster Management Act 2005

UNIT-II:

(09hrs)

Causes and immediate effects of Disasters - Preparedness of disasters –Precautions – Dissemination of information - Nature and concepts - Role of National Disaster Management Authority and Role of Government and non governmental organizations in protecting human livestock and natural resources.- Use of technology -Role of Citizens and Youth in the prevention.

UNIT-III:

(09 hrs)

Post disaster effects - short term - Procedures for Rehabilitation and Recovery - Role of volunteers and Safety Precautions - Long term remedial and preventive measures – Collection, filing and storage of information - Case studies

Suggested co curriculum Activities:

(06 hrs)

1. Invite lectures by local experts
2. Training on preparedness, post disaster services
3. Analysis of Case studies
4. Visit to a disaster management office and facility
5. Assignments, Group discussion, quiz etc.

Reference books:

1. Jagbirsingh - Disaster Management Future challenges and opportunities- - K.W.Publishers
2. GOI - UNDP Disaster Management Guidelines
3. J.P.Singhal - Disaster Management - Laxmi Publications
4. www. ndma. gov.in
5. Wikipedia and other websites on Disaster management.



UG- SKILL DEVELOPMENT COURSE

ONLINE BUSINESS

(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
III	Skill Development Course	Online Business	30	2	2	50 Marks

Learning Outcomes:

After successful completion of the course, students will be able to;

- Understand the online business and its advantages and disadvantages
- Recognize new channels of marketing, their scope and steps involved
- Analyze the procurement, payment process, security and shipping in online business
- Create new marketing tools for online business
- Define search engine, payment gateways and SEO techniques.

Unit-I:

(06 Hrs)

Introduction to Online-business-Definition-Characteristics-Advantages of Online Business-Challenges-Differences between off-line business, e-commerce and Online Business.

Unit-II:

(10 Hrs)

Online-business Strategies-Strategic Planning Process- Procurement -Logistics & Supply Chain Management- Customer Relationship management.

Unit-III:

(10 Hrs)

Designing Online Business Website – Policies - Security & Legal Issues - Online Advertisements - Payment Gateways - Case Study

Co-curricular Activities Suggested:

(4 hrs)

1. Assignments, Group discussion, Quiz etc.
2. Short practical training in computer lab
3. Identifying online business firms through internet
4. Invited Lectures by e-commerce operators
5. Working with Google and HTML advertisements.
6. Visit to a local online business firm.

Reference books:

1. David Whiteley, "E-Commerce", Tata McGraw Hill, 2000.
2. E Business by Jonathan Reynolds from Oxford University Press.
3. Soka, From EDI to Electronic Commerce, McGraw Hill.
4. Websites on Online business.



UG- SKILL DEVELOPMENT COURSE

POULTRY FARMING
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
III	Skill Development Course	Poultry Farming	30	2	2	50 Marks

Learning Outcomes: By successful completion of the course, students will be able to;

- Understand the field level structure and functioning of insurance sector and it's role in protecting the risks
- Comprehend pertaining skills and their application for promoting insurance coverage
- Prepare better for the Insurance Agent examination conducted by IRDA
- Plan 'promoting insurance coverage practice' as one of the career options.

Unit I (Introduction to Poultry Farming): (10Hrs)

- 1.1 General introduction to poultry farming -Definition of Poultry; Past and present scenario of poultry industry in India.
- 1.2 Principles of poultry housing. Poultry houses. Systems of poultry farming.
- 1.3 Management of chicks, growers and layers. Management of Broilers.
- 1.4 Preparation of project report for banking and insurance

Unit II (Feed and Livestock Health Management): (10 Hrs):

- 2.1 Poultry feed management – Principles of feeding, Nutrient requirements for different stages of layers and broilers. Feed formulation and Methods of feeding.
- 2.2 Poultry diseases – viral, bacterial, fungal and parasitic(two each); symptoms, control and management; Vaccination programme.

Unit III (Harvesting of Eggs and Sanitation): (10 Hrs)

- 3.1 Selection, care and handling of hatching eggs. Egg testing. Methods of hatching.
- 3.2 Brooding and rearing. Sexing of chicks.
- 3.3 Farm and Water Hygiene, Recycling of poultry waste.

Co-curricular Activities Suggested: (4 hrs)

1. Group discussion& SWOT analysis
2. Visit to a poultry farm
3. Invited Lectures by Concerned officers of government or private farms
4. Cheap and Healthy Feed preparation by students based on government standards
5. Market study and Survey (Monitoring of daily price hike in poultry market and analysis)
6. Online Swayam Moocs course on poultry farming (see reference 9 below)

Reference books:

1. Sreenivasaiah., P. V., 2015. Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi
2. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi"
3. Hurd M. Louis, 2003. Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow.
4. Life and General Insurance Management
5. Financial services, Tata McGraw hill
6. <http://www.asci-india.com/BooksPDF/Small%20Poultry%20Farmer.pdf>
7. https://nsdcindia.org/sites/default/files/MC_AGR-Q4306_Small-poultry-farmer-.pdf
8. <http://ecoursesonline.iasri.res.in/course/view.php?id=335>
9. https://swayam.gov.in/nd2_nou19_ag09/preview



UG- SKILL DEVELOPMENT COURSE
FINANCIAL MARKETS
(w.e.f. 2020-2021 A.Y.)

Semester	Course Code (SD)	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
III	Skill Development Course	Financial Markets	30	2	2	50 Marks

Learning Outcomes:

After successful completion of this course, the students will be able to;

- Acquire knowledge of financial terms
- Know the concepts relating to and markets and different avenues of investment
- Understand the career skills related to Stock Exchanges
- Comprehend the personal financial planning and money market skills

UNIT-I: (06hrs)
Indian Financial System- its components - Financial markets and institutions

UNIT-II: (10hrs)
Capital Market - its function - organizations - elements - (shares, debentures, bonds, mutual funds) debt market - Equity market (SEBI) and secondary market (NSE)

UNIT-III: (10hrs)
Money market - Organized - Unorganized - Sub market (call money, commercial bills, Treasury bill, Certificate of Deposit, Commercial papers)

Co-curricular activities: (04 hrs)

1. Collection and study of pamphlets, application forms etc.
2. Invited lectures on the field topics by local experts
3. Introducing Online classes from NSE
4. Field visit to mutual fund offices/share brokers
5. Observation, study and analysis of selected companies share prices
6. Assignments, Group discussion, quiz etc.

Reference books:

- 1.T.R. Jain R.L.Sarma - Indian Financial System- VK Global publisher
2. Jithendra Gala - Guide to Indian Stock markets Buzzing Stock publishing house
3. Saha Siddhartha- Indian financial System- and Markets - McGraw hill
4. Websites on Indian Financial markets.



B. Sc	Semester: III	Credits:4
Course: 3	PYTHON PROGRAMMING FOR DATA ANALYSIS	Hrs/Wk: 4

Aim and objectives of Course:

- To be able to Program in Python
- To know and understand the data Analysis phases
- To know the usage of all libraries

Learning outcomes of Course:

- Understands and learn all basic concepts of
- PythonProgram Data Analysis methods in Python
- Get used with Python Programming environments

UNIT I:

What is Data Analysis? Differences between Data Analysis and Analytics, What is Python, Why Python for Data Analysis? What is Library, Essential Python Libraries. Python Language basics, I Python and Jupyter Notebook. Python Language Basics.

UNIT II:

Built-in Data Structures, Functions, Files and Operating System. **NumPy Basics:** Arrays and Vectorized Computation, The Numpynd array, Universal Functions, Array-Oriented Programming with Arrays, File Input and Output with Arrays, Linear Algebra, Pseudorandom Number Generation.

UNIT III:

Getting Started with Pandas: Introduction to Pandas Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics
Data Loading, Storage and File Formats: Reading and Writing Data in Text Format, Binary Data Formats, Interacting with Web APIs, Interacting with Databases.

UNIT IV:

Data Cleaning and Preparation: Handling Missing Data, Data Transformation, String Manipulation.

Data Wrangling: Join, Combine and Reshape: Hierarchical Indexing, Combining and Merging Datasets, Reshaping and Pivoting.

UNIT V:

Introduction to Modeling Libraries in Python: Interfacing between pandas and Model code, Creating model descriptions with Patsy, Introduction to stats models.

Plotting and Visualization: A brief matplotlib API Primer, Plotting with Pandas and Seaborn, Other Python visualization tools.

TEXT BOOKS:

1. Wes McKinney "Python for Data Analysis" O'reilly Publications Second edition
2. Charles R Suverance "Python for Everybody" Exploring data using Python 3

REFERENCE BOOKS:

3. John Zelle Michael Smith Python Programming, second edition 2010



Co-curricular Activities

Take up any application which involves the python coding.Example Case studies/Simulators:

(<https://knightlab.northwestern.edu/2014/06/05/five-mini-programming-projects-for-the-python-beginner/>)

1. Dice Rolling Simulator
2. Guess the number
3. Text based adventure game
4. Hangman

Continuous assessment:

Let the students be tested in the following questions from each unit

1. What is Data Analysis. List out the differences between data analysis and data analytics
2. What is Python? Explain Python basics
3. Explain NumPy Basics
4. What is Data Loading. Explain Pandas Data Structures
5. What is Data Cleaning. Explain different phases in it
6. Explain Plotting and Visualization in Python



B. Sc	Semester: III	Credits:1
Course: 3	PYTHON PROGRAMMING LAB	Hrs/Wk: 2

PYTHON PROGRAMMING LAB

1. Use matplotlib and plot an inline in Jupyter.
2. Implement commands of Python Language basics
3. Create Tuples, Lists and illustrate slicing conventions.
4. Create built-in sequence functions.
5. Clean the elements and transform them by using List, Set and Dict Comprehensions.
6. Create a functional pattern to modify the strings in a high level.
7. Write a Python Program to cast a string to a floating-point number but fails with Value Error on improper inputs using Errors and Exception handling.
8. Create an n array object and use operations on it.
9. Use arithmetic operations on Numpy Arrays
10. Using Numpy array perform Indexing and Slicing Boolean Indexing, FancyIndexing operations
11. Create an image plot from a two-dimensional array of function values.
12. Implement some basic array statistical methods (sum, mean, std, var, min,max, argmin, argmax, cumsum and cumprod) and sorting with sort method.
13. Implement numpy.random functions.
14. Plot the first 100 values on the values obtained from random walks.
15. Create a data frame using pandas and retrieve the rows and columns in it by performing some indexing options and transpose it.
16. Implement the methods of descriptive and summary statistics
17. Load and write the data from and to different file formats including Web APIs.
18. Implement the data Cleaning and Filtering methods (Use NA handling methods, fillna function arguments)
19. Transform the data using function or mapping
20. Rearrange the data using unstack method of hierarchical Indexing
21. Implement the methods that summarize the statistics by levels.
22. Use different Join types with how argument and merge data with keys and multiple keys.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: III	Credits: 4
Course: 3	STATISTICAL INFERENCE	Hrs/Wk: 4

Course Learning Outcomes:

The students will acquire

- Concept of law large numbers and their uses
- Concept of central limit theorem and its uses in statistics
- concept of random sample from a distribution, sampling distribution of a statistic, standard error of important estimates such as mean and proportions,
- knowledge about important inferential aspects such as point estimation, test of hypotheses and associated concepts,
- knowledge about inferences from Binomial, Poisson and Normal distributions as illustrations,
- concept about non-parametric method and some important non-parametric tests.

UNIT I:

Concepts: Population, Sample, Parameter, statistic, Sampling distribution, Standard error. convergence in probability and convergence in distribution, law of large numbers, central limit theorem (statements only). Student's t- distribution, F – Distribution, χ^2 -Distribution: Definitions, properties and their applications.

UNIT II:

Theory of estimation: Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, & sufficiency and. Statement of Neyman's factorization theorem. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Binomial, Poisson & Normal Population parameters estimate by MLE method. Confidence Intervals.

UNIT III:

Testing of Hypothesis: Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests. Neyman- Pearson's lemma. Examples in case of Binomial, Poisson, Exponential and Normal distributions.

UNIT IV:

Large sample Tests: large sample test for single mean and difference of two means, confidence intervals for mean(s). Large sample test for single proportion, difference of proportions. standard deviation(s) and correlation coefficient(s).

Small Sample tests: t-test for single mean, difference of means and paired t-test. χ^2 -test for goodness of fit and independence of attributes. F-test for equality of variances.

UNIT V:

Non-parametric tests- their advantages and disadvantages, comparison with parametric tests. Measurement scale- nominal, ordinal, interval and ratio. One sample runs test, sign test and Wilcoxon signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon – Mann-Whitney U test, Wald Wolfowitz's runs test.

TEXT BOOKS:

1. BA/BSc II year statistics - statistical methods and inference - Telugu Academy by A.Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C. RavichandraKumar.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC.PHI.



REFERENCE BOOKS:

1. Fundamentals of Mathematics statistics : VK Kapoor and SCGuptha.
2. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das GupthaB.
3. Introduction to Mathematical Statistics : HoelP.G.
4. Hogg Tanis Rao: Probability and Statistical Inference. 7th edition.Pearson.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: III	Credits: 1
Course: 3(L)	Practical	Hrs/Wk: 2

List of Experiments:

1. Large sample test for difference of means
2. Large sample test for single proportion
3. Large sample test for difference of proportions
4. Large sample test for difference of standard deviations
5. Large sample test for correlation coefficient
6. Small sample test for single mean
7. Small sample test for difference of means
8. Small sample test for correlation coefficient
9. Paired t-test (paired samples).
10. Small sample test for single variance (χ^2 - test)
11. Small sample test for difference of variances (F-test)
12. χ^2 - test for goodness of fit and independence of attributes
13. Nonparametric tests for single sample (run test, sign test and Wilcoxon signed rank test)
14. Nonparametric tests for related samples (sign test and Wilcoxon signed rank test)
15. Nonparametric tests for two independent samples (Median test, Wilcoxon –Mann-Whitney - U test, Wald - Wolfowitz' s run test)

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MS Word for writing inferences.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester: III	Credits: 4
Course: 3	DATABASE MANAGEMENT SYSTEM	Hrs/Wk: 4

Aim and objectives of Course:

- The objective of the course is to introduce the design and development of databases with special emphasis on relational databases.

Learning outcomes of Course: Upon successful completion of the course, a student will be able to:

- Gain knowledge of Database and DBMS.
- Understand the fundamental concepts of DBMS with special emphasis on relational data model.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database
- Model data base using ER Diagrams and design database schemas based on the model.
- Create a small database using SQL.
- Store, Retrieve data in database.

Detailed Syllabus: (Five units with each unit having 12 hours of class work)

UNIT I:

Overview of Database Management System: Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base, costs and risks of database approach.

UNIT II:

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modeling.

UNIT III:

Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms upto 3rd normal form.

UNIT IV:

Structured Query Language: Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.

UNIT V

PL/SQL: Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

TEXT BOOKS:

- Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill
- Database Management Systems by Raghu Ramakrishnan, McGrawhill

REFERENCES:

- Principles of Database Systems by J. D. Ullman
- Fundamentals of Database Systems by R. Elmasri and S. Navathe
- SQL: The Ultimate Beginners Guide by Steve Tale.



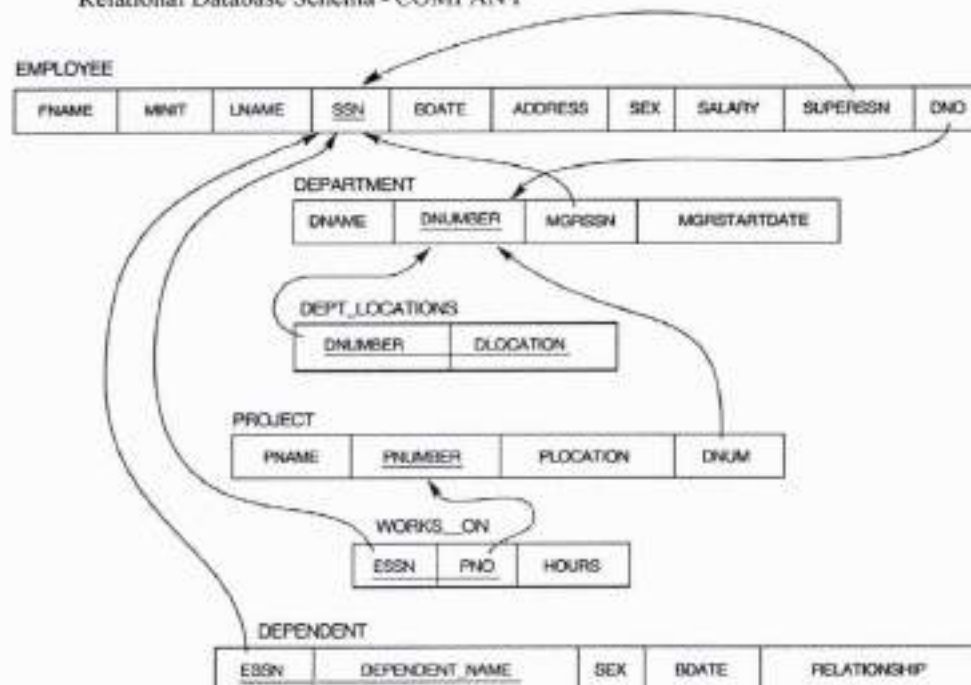
ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester: III	Credits: 1
Course: 3(L)	DATABASE MANAGEMENT SYSTEM LAB	Hrs/Wk: 2

Details of Lab Syllabus: DATABASE MANAGEMENT SYSTEM LAB

1. Draw ER diagram for hospital administration
2. Creation of college database and establish relationships between tables
3. Relational database schema of a company is given in the following figure.

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create above tables with relevant *Primary Key, Foreign Key and other constraints*
2. Populate the tables with data
3. Display all the details of all employees working in the company.
4. Display *ssn, lname, fname, address* of employees who work in department no 7.
5. Retrieve the *Birthdate and Address* of the employee whose name is 'Franklin T.Wong'
6. Retrieve the name and salary of every employee.
7. Retrieve all distinct salary values
8. Retrieve all employee names whose address is in 'Bellaire'
9. Retrieve all employees who were born during the 1950s
10. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000 (inclusive)



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
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11. Retrieve the names of all employees who do not have supervisors
12. Retrieve SSN and department name for all employees
13. Retrieve the name and address of all employees who work for the 'Research' department
14. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
15. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
16. Retrieve all combinations of Employee Name and Department Name
17. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
18. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
19. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
20. Select the names of employees whose salary does not match with salary of any employee in department.
21. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
22. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings
23. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
24. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
25. Delete all dependents of employee whose *ssn* is '123456789'.
26. Perform a query using alter command to drop/add field and a constraint in Employee table.



RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms 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 (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

B. General

1. Group Discussion
2. Try to solve MCQ's available online.
3. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Problem-solving exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports like "Creating Text Editor in C".
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs from individual and collaborative work.



B Sc	Semester: IV	Credits: 4
Course: 4	BIG DATA ANALYTICS USING SPARK	Hrs/Wk: 4

Aim and objectives of Course:

- To Understand the Complete Architecture of Spark
- To know the differences between Hadoop and Spark
- To know the concepts of Spark Programming

Learning outcomes of Course:

- Students will get well knowledge of what is
- Big Data Knowledge in Spark Eco System
- Mapping of Data Analytics techniques in Spark
- Application of Spark Programming to Analytics problems

UNIT I:

Introduction to Big Data: What is Big Data-Characteristics, Data in the Warehouse and Data in Hadoop, Why is Big Data Important- When to consider Big Data Solution, Applications.

Introduction to Hadoop: Hadoop- definition, Application development in Hadoop. The building blocks of Hadoop, Name Node, Data Node, Secondary Name Node, Job Tracker and Task Tracker.

UNIT II:

Introduction to Spark: What is Apache Spark, Why Spark when Hadoop is there, Spark Features, , Spark components, Spark program flow, Spark Eco System. Differences between implementation of programs in Hadoop and Spark Programming environments.

UNIT III:

Spark Fundamentals- Using spark in action VM, Using Spark Shell and writing first spark program, Basic RDD actions and transformations.

Spark SQL-Working with Data Frames, Using SQL Commands, Saving and loading Data Frame.

UNIT IV:

Streaming in Spark- Writing spark streaming applications, Using external data sources, structured streaming.

Spark MLlib-Introduction to Machine Learning. Definition of Machine Learning, Machine Learning with Spark.

UNIT V:

Graph Representation in MapReduce: Graph Processing with Spark, Spark GraphX, GraphX features, Graph Examples, Graph algorithms-Shortest Path Algorithm.

TEXT BOOKS:

1. Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data by Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, 1st Edition, TMH,2012.
2. Spark in Action PetarZecevic, markoBonaci Manning Publications-2016.
3. Learning Spark"Holden KarauA. Konwinskietc., "O'reilly Publications.



REFERENCE BOOKS:

1. Hadoop in Action by Chuck Lam, MANNING Publishers.
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Mining of massive datasets, AnandRajaraman, Jeffrey D Ullman, Wiley Publications.

Student Activities:

Take any dataset and do the following machine learning steps.(<https://www.guru99.com/pyspark-tutorial.html>)

1. Use basic Operations with PySpark(Spark with Python)
2. Data Pre-processing
3. Build a data processing pipeline
4. Build the classifier
5. Train and evaluate the model
6. Tune the hyper parameter

Continuous assessment:

Let the students be tested in the following questions from each unit

7. What is Big Data? Explain the characteristics of it
8. What is Spark? What are the advantages of it over Hadoop
9. Explain Spark SQL
10. Explain Spark Streaming
11. Explain Shortest Path Algorithm.



B Sc	Semester: IV	Credits: 1
Course: 4	BIG DATA ANALYTICS USING SPARK PROGRAMMING LAB	Hrs/Wk: 2

SPARK PROGRAMMING LAB

1. Using Python Implement the following Programs
 - a) Write Program to implement arithmetic operations
 - b) Write Program to find the biggest of two numbers
 - c) Write a program to find the matrix multiplication
2. Install Hadoop
3. Install Spark on top of Hadoop
4. Create and Implement the transformations in RDDs
5. Create a data frame from an existing RDD using Spark Session
6. Execute a Word Count example in Spark Shell by creating RDDs.
7. Implement Spark SQL Queries in Python.
8. Write a Program to implement maximum temperature give the recordings of one year.
9. Write a Program to implement the Pie estimation
10. Write a User Defined Function to convert a given text to Uppercase.



B. Sc	Semester: IV	Credits: 4
Course: 5	DATA VISUALIZATION	Hrs/Wk: 4

Aim and objectives of Course:

- To know the importance of data Visualization in the world of Data Analytics and Prediction
- To know the important libraries in Tableau
- To get equipped with Tableau Tool

Learning outcomes of Course:

- Students should be able to visualize data through seven stages of data analysis process
- Should be able to do explanatory and hybrid types of data visualization
- Should be able to understand various stages of visualizing data

UNIT I:

Creating Visual Analytics with tableau desktop, connecting to your data-How to Connect to your data, What are generated Values? Knowing when to use a direct connection, Joining tables with tableau, blending different data sources in a single worksheet.

UNIT II:

Building your first Visualization- How Me works- Chart types, Text Tables, Maps, bar chart, Line charts, Area Fill charts and Pie charts, scatter plot, Bullet graph, Gantt charts, Sorting data in tableau, Enhancing Views with filters, sets groups and hierarchies.

UNIT III:

Creating calculations to enhance your data- What is aggregation, what are calculated values and table calculations, Using the calculation dialog box to create, Building formulas using table calculations, Using table calculation functions

UNIT IV:

Using maps to improve insights-Create a Standard Map View, Plotting your own locations on a map, Replace Tableau's standard maps, Shaping data to enable Point-to-Point mapping.

UNIT V:

Developing an Adhoc analysis environment- generating new data with forecasts, providing self evidence adhoc analysis with parameters, Editing views in tableau Server.

TEXT BOOKS:

1. Tableau your data-Daniel G. Murray and the Inter works BI team, Wiley Publications
2. Tableau Data Visualizaton Cookbook, AshutoshNandeshwar, PACKT publishing.
3. Storytelling with Data: A Data Visualization Guide for Business Professionals by Cole NussbaumerKnaflie (2014)
4. ggplot2: Elegant Graphics for Data Analysis by Hadley Wickham (2009)

REFERENCE BOOKS:

5. Designing Data Visualizations: Representing Informational Relationships by Noah Iliinsky, Julie Steele (2011)
6. Alexandru C. Telea – “Data Visualization principles and practice” Second Edition, CRC Publications
7. Joshua N. Millign–“ Learning Tableau -2019” – Third Edition- Packt publications



Student Activity

Create a sample super store data set and visualize the following requirements

General Requirements

1. Dashboard size is 1250px wide by 750px tall.
2. Prefer using containers
3. The dashboard has a total of 5 containers (no more, no less)
4. The Filter Pane
5. Each filter has some padding

Charts Pane Requirement

1. All 3 charts must be in one vertical container
2. Do proper formatting
3. Each chart has some padding between them and other objects
4. Each chart has a grey border, slightly darker than the Pane background color.
5. The Pane under the Title has a border

Business Requirements

1. Show four filters- Category, Sub-Category, Region, and Segment. These filters should have only relevant values.
2. The dashboard should have the title "Executive sales"
3. The first chart should have the title "YTS KPIs" and should show the following-
Total Discount
Overall Profit
Total Quantity and
Total Sales
4. The second graph should have the title as "Sales" and should show monthly sales per year. Make sure it is an area chart with proper formatting.
5. The third graph should the title as "Profit" and should show monthly profit per year. Make sure it is an area chart with proper formatting.

Continuous assessment:

Let the students be tested in the following questions from each unit

10. What are generated values? Join tables using Tableau
11. Create any visualization charts using Chart types, Text Tables, Maps, bar chart, Line charts, Area Fill charts and Pie charts, scatter plot etc.,
12. What is aggregation, what are calculated values and table calculations?
13. Using Standard Map View, Plot your own locations on a map
14. Develop an Adhoc analysis environment.



B. Sc	Semester: IV	Credits: 1
Course: 5	DATA VISUALIZATION LAB	Hrs/Wk: 2

DATA VISUALIZATION LAB USING TABLEAU

1. Connect to data Sources
2. Create Univariate Charts
3. Create Bivariate and Multivariate charts
4. Create Maps
5. Calculate user-defined fields
6. Create a workbook data extract
7. Save a workbook on a Tableau server and web
8. Export images, data.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: IV	Credits: 4
Course: 4	SAMPLING TECHNIQUES AND DESIGN OF EXPERIMENTS	Hrs/Wk: 4

Course Learning Outcomes

The students shall get

- Introduced to various statistical sampling schemes such as simple, stratified and systematic sampling.
- an idea of conducting the sample surveys and selecting appropriate sampling techniques,
- Knowledge about comparing various sampling techniques.
- carry out one way and two way Analysis of Variance,
- understand the basic terms used in design of experiments,
- use appropriate experimental designs to analyze the experimental data.

UNIT I:

Simple Random Sampling (with and without replacement): Notations and terminology, various probabilities of selection. Random numbers tables and its uses. Methods of selecting simple random sample, lottery method, method based on random numbers. Estimates of population total, mean and their variances and standard errors, determination of sample size, simple random sampling of attributes.

UNIT II:

Stratified random sampling: Stratified random sampling, Advantages and Disadvantages of Stratified Random sampling, Estimation of population mean, and its variance. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.

Systematic sampling: Systematic sampling definition when $N = nk$ and merits and demerits of systematic sampling - estimate of mean and its variance. Comparison of systematic sampling with Stratified and SRSWOR.

UNIT III:

Analysis of variance : Analysis of variance(ANOVA) –Definition and assumptions. One-way with equal and unequal classification, Two way classification.

Design of Experiments: Definition, Principles of design of experiments, CRD: Layout, advantages and disadvantage and Statistical analysis of Completely Randomized Design(C.R.D).

UNIT IV:

Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts and Analysis, MissingplottechniqueinRBDandLSD.EfficiencyRBDoverCRD,EfficiencyofLSDoverRBDand CRD.

UNIT V:

Factorial experiments – Main effects and interaction effects of 2^2 and 2^3 factorial experiments and theirStatistical analysis. Yates procedure to find factorial effect totals.

TEXT BOOKS:

1. Telugu AcademyBA/BSc III year paper - III Statistics - applied statistics - Telugu academy by Prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.PapaiahSastry.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC.PHI.

REFERENCE BOOKS:

1. Fundamentals of applied statistics : VK Kapoor and SCGupta.
2. Indian Official statistics - MR Saluja.
3. Anuvarthita Sankyaka Sastram - TeluguAcademy.



B. Sc	Semester: IV	Credits: 1
Course: 4(L)	Practical	Hrs/Wk: 2

List of Experiments:

Sampling Techniques:

Estimation of population mean and its variance by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR.
2. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.
3. Systematic sampling with $N=nk$. Comparison of systematic sampling with Stratified and SRSWOR.

Design of Experiments:

4. ANOVA - one - way classification with equal and unequal number of observations
5. ANOVA Two-way classification with equal number of observations.
6. Analysis of CRD.
7. Analysis of RBD Comparison of relative efficiency of CRD with RBD
8. Estimation of single missing observation in RBD and its analysis
9. Analysis of LSD and efficiency of LSD over CRD and RBD
10. Estimation of single missing observation in LSD and its analysis
11. Analysis of 2^2 with RBD layout
12. Analysis of 2^3 with RBD layout

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MS Word for writing inferences.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: IV	Credits: 4
Course: 5	APPLIED STATISTICS	Hrs/Wk: 4

Course Learning Outcomes

After completion of this course, the students will know about

- Time series data, its applications to various fields and components of time series,
- Fitting and plotting of various growth curves such as modified exponential, Gompertz and logistic curve, Fitting of trend by Moving Average method,
- Measurement of Seasonal Indices by Ratio-to-Trend , Ratio-to-Moving Average and Link Relative methods,
- Applications to real data by means of laboratory assignments.
- Interpret and use a range of index numbers commonly used in the business sector
- Perform calculations involving simple and weighted index numbers
- Understand the basic structure of the consumer price index and perform calculations involving its use
- Various data collection methods enabling to have a better insight in policy making, planning and systematic implementation, Construction and implementation of life tables, Population growth curves, population estimates and projections,
- Real data implementation of various demographic concepts as outlined above through practical assignments.

UNIT I:

Time Series: Time Series and its components with illustrations, additive, multiplicative models. Trend: Estimation of trend by free hand curve method, method of semi averages. Determination of trend by least squares (Linear trend, parabolic trend only), moving averages method.

UNIT II:

Seasonal Component: Determination of seasonal indices by simple averages method, ratio to moving average, Ratio to trend and Link relative methods, Depersonalization.

UNIT III:

Growth curves: Modified exponential curve, Logistic curve and Gompertz curve, fitting of growth curves by the method of three selected points and partial sums. Detrending. Effect of elimination of trend on other components of the time series.

UNIT IV:

Index numbers: Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and weighted index numbers. Laspeyres's, Paasche's and Fisher's index numbers, Criterion of a good index number, Fisher's ideal index numbers. Cost of living index number and wholesale price index number.

UNIT V:

Vital Statistics: Introduction, definition and uses of vital statistics, sources of vital statistics, measures of different Mortality and Fertility rates, Measurement of population growth. Life tables: construction and uses of life tables.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

TEXT BOOKS:

1. Fundamentals of applied statistics : VK Kapoor and SCGupta.
2. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.PapaiahSastry.

REFERENCE BOOKS:

1. Anuvarthita Sankyaka Sastram - TeluguAcademy.
2. Mukopadhyay, P (2011). Applied Statistics, 2nd ed. Revised reprint, Books and Allied Pvt. Ltd.
3. Brockwell, P.J. and Devis, R.A. (2003). Introduction to Time Series Analysis. Springer.
4. Chatfield, C. (2001). Time Series Forecasting., Chapman & Hall.
5. Srinivasan, K. (1998). Demographic Techniques and Applications. Sage Publications
6. Srivastava O.S. (1983). A Text Book of Demography. Vikas Publishing House



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: IV	Credits: 1
Course: 5(L)	Practical	Hrs/Wk: 2

List of Experiments:

Time Series:

1. Measurement of trend by method of moving averages(odd and evenperiod)
2. Measurement of trend by method of Least squares(linear andparabola)
3. Determination of seasonal indices by method simpleaverages
4. Determination of seasonal indices by method of Ratio to movingaverages
5. Determination of seasonal indices by method of Ratio totrend
6. Determination of seasonal indices by method of Linkrelatives

Index Numbers:

7. Computation of simple indexnumbers.
8. Computation of all weighted index numbers.
9. Computation of reversaltests.

Vital Statistics:

10. Computation of various Mortalityrates
11. Computation of various Fertilityrates
12. Computation of various Reproductionrates.
13. Construction of LifeTables

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The excel outputshall be exported to MS Word for writing inferences.



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B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester: IV	Credits: 4
Course: 4	OBJECT ORIENTED PROGRAMMING USING JAVA	Hrs/Wk: 4

Aim and objectives of Course:

- To introduce the fundamental concepts of Object-Oriented programming and to design & implement object oriented programming concepts in Java.

Learning outcomes of Course:

- Understand the benefits of a well-structured program
- Understand different computer programming paradigms
- Understand underlying principles of Object-Oriented Programming in Java
- Develop problem-solving and programming skills using OOP concepts
- Develop the ability to solve real-world problems through software development in high-level programming language like Java

Detailed Syllabus: (Five units with each unit having 12 hours of class work)

UNIT I:

Introduction to Java: Features of Java, The Java virtual Machine, Parts of Java

Naming Conventions and Data Types: Naming Conventions in Java, Data Types in Java, Literals

Operators in Java: Operators, Priority of Operators. **Control Statements in Java:** if... else Statement, do... while Statement, while Loop, for Loop, switch Statement, break Statement, continue Statement, return Statement. **Input and Output:** Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(). **Arrays:** Types of Arrays, Three Dimensional Arrays (3D array), array name. length, Command Line Arguments

UNIT II:

Strings: Creating Strings, String Class Methods, String Comparison, Immutability of Strings.

Introduction to OOPs: Problems in Procedure Oriented Approach, Features of Object-Oriented Programming System (OOPS). **Classes and Objects:** Object Creation, Initializing the Instance Variables, Access Specifiers, Constructors.

Methods in Java: Method Header or Method Prototype, Method Body, Understanding Methods, Static Methods, Static Block, The keyword 'this', Instance Methods, Passing Primitive Data Types to Methods, Passing Objects to Methods, Passing Arrays to Methods, Recursion, Factory Methods.

Inheritance: Inheritance, The keyword 'super', The Protected Specifier, Types of Inheritance.

UNIT III:

Polymorphism: Polymorphism with Variables, Polymorphism using Methods, Polymorphism with Static Methods, Polymorphism with Private Methods, Polymorphism with Final Methods, final Class.

Type Casting: Types of Data Types, Casting Primitive Data Types, Casting Referenced Data Types, The Object Class. **Abstract Classes:** Abstract Method and Abstract Class.

Interfaces: Interface, Multiple Inheritance using Interfaces. **Packages:** Package, Different Types of Packages, The JAR Files, Interfaces in a Package, Creating Sub Package in a Package, Access Specifiers in Java, Creating API Document. **Exception Handling:** Errors in Java Program, Exceptions, throws Clause, throw Clause, Types of Exceptions, Re-throwing an Exception.

UNIT - IV

Streams: Stream, Creating a File using FileOutputStream, Reading Data from a File using FileInputStream, Creating a File using FileWriter, Reading a File using FileReader, Zipping and Unzipping Files, Serialization of Objects, Counting Number of Characters in a File, File Copy, File Class



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B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

Threads: Single Tasking, Multi Tasking, Uses of Threads, Creating a Thread and Running it, Terminating the Thread, Single Tasking Using a Thread, Multi Tasking Using Threads, Multiple Threads Acting on Single Object, Thread Class Methods, Deadlock of Threads, Thread Communication, Thread Priorities, thread Group, Daemon Threads, Applications of Threads, Thread Life Cycle.

UNIT V:

Applets: Creating an Applet, Uses of Applets, <APPLET> tag, A Simple Applet, An Applet with Swing Components, Animation in Applets, A Simple Game with an Applet, Applet Parameters.

Java Database Connectivity: Database Servers, Database Clients, JDBC (Java Database Connectivity), Working with Oracle Database, Working with MySQL Database, Stages in a JDBC Program, Registering the Driver, Connecting to a Database, Preparing SQL Statements, Using jdbc-odbc Bridge Driver to Connect to Oracle Database, Retrieving Data from MySQL Database, Retrieving Data from MS Access Database, Stored Procedures and CallableStatements, Types of Result Sets.

TEXT BOOKS:

1. Core Java: An Integrated Approach, Authored by Dr. R. Nageswara Rao &Kogent Learning Solutions Inc.
2. E.Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw- HillCompany.

REFERENCES:

1. John R. Hubbard, Programming with Java, Second Edition, Schaum's outlineSeries, TMH.
2. Deitel&Deitel. Java TM: How to Program, PHI (2007)



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B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester: IV	Credits: 1
Course: 4(L)	Object Oriented Programming using Java Lab	Hrs/Wk: 2

Details of Lab Syllabus: Object Oriented Programming using Java Lab

1. Write a program to read *Student Name, Reg.No, Marks[5]* and calculate *Total,Percentage, Result*. Display all the details of students
2. Write a program to perform the following String Operations
 - a. Read a string
 - b. Find out whether there is a given substring or not
 - c. Compare existing string by another string and display status
 - d. Replace existing string character with another character
 - e. Count number of words in a string
3. Java program to implements Addition and Multiplication of two N X N matrices.
4. Java program to demonstrate the use of Constructor.
5. Calculate area of the following shapes using method overloading.
 - a. Triangle
 - b. Rectangle
 - c. Circle
 - d. Square
6. Implement inheritance between *Person (Aadhar, Surname, Name, DOB, and Age)* and *Student (Admission Number, College, Course, Year)*classes where *ReadData(),DisplayData()* are overriding methods.
7. Java program for implementing Interfaces
8. Java program on Multiple Inheritance.
9. Java program for to display *Serial Number from 1 to N* by creating two Threads
10. Java program to demonstrate the following exception handlings
 - a. Divided by Zero
 - b. Array Index Out of Bound
 - c. File Not Found
 - d. Arithmetic Exception
 - e. User Defined Exception
11. Create an Applet to display different shapes such as Circle, Oval, Rectangle, Square and Triangle.
12. Write a program to create *Book (ISBN,Title, Author, Price, Pages, Publisher)*structure and store book details in a file and perform the following operations
 - a. Add book details
 - b. Search a book details for a given ISBN and display book details, if available
 - c. Update a book details using ISBN
 - d. Delete book details for a given ISBN and display list of remaining Books



RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms 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 (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

B. General

1. Group Discussion
2. Try to solve MCQ's available online.
3. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Problem-solving exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports like "Creating Text Editor in C".
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs form individual and collaborative work.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester: IV	Credits: 4
Course: 5	OPERATING SYSTEMS	Hrs/Wk: 4

Aim and objectives of Course:

- This course aims to introduce the structure and organization of a file system. It emphasizes various functions of an operating system like memory management, process management, device management, etc.

Learning outcomes of Course:

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

- Know Computer system resources and the role of operating system in resource management with algorithms
- Understand Operating System Architectural design and its services.
- Gain knowledge of various types of operating systems including Unix and Android.
- Understand various process management concepts including scheduling, synchronization, and deadlocks.
- Have a basic knowledge about multithreading.
- Comprehend different approaches for memory management.
- Understand and identify potential threats to operating systems and the security features design to guard against them.
- Specify objectives of modern operating systems and describe how operating systems have evolved over time.
- Describe the functions of a contemporary operating system

Detailed Syllabus: (Five units with each unit having 12 hours of class work)

UNIT I:

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

UNIT II:

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Preemptive and Preemptive Scheduling Algorithms.

UNIT III:

Process Management: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery. Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter- process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

UNIT IV:

Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.

UNIT V:

File and I/O Management, OS security : Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal Access Authorization Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

TEXT BOOKS:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and GregGagne (7thEdition) Wiley India Edition.
2. Operating Systems: Internals and Design Principles by Stallings (Pearson)

REFERENCES:

1. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)
2. Online Resources for UNIT V



B Sc	Semester: IV	Credits: 1
Course: 5(L)	Operating Systems Lab using C/Java	Hrs/Wk: 2

Details of Lab Syllabus: Operating Systems Lab using C/Java

1. Write a program to implement Round Robin CPU Scheduling algorithm
2. Simulate SJF CPU Scheduling algorithm
3. Write a program the FCFS CPU Scheduling algorithm
4. Write a program to Priority CPU Scheduling algorithm
5. Simulate Sequential file allocation strategies
6. Simulate Indexed file allocation strategies
7. Simulate Linked file allocation strategies
8. Simulate MVT and MFT memory management techniques
9. Simulate Single level directory File organization techniques
10. Simulate Two level File organization techniques
11. Simulate Hierarchical File organization techniques
12. Write a program for Bankers Algorithm for Dead Lock Avoidance
13. Implement Bankers Algorithm Dead Lock Prevention.
14. Simulate all Page replacement algorithms.
 - a) FIFO
 - b) LRU
 - c) LFU
15. Simulate Paging Techniques of memory management



RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms 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 (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

B. General

1. Group Discussion
2. Try to solve MCQ's available online.
3. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Problem-solving exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports like "Creating Text Editor in C".
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs form individual and collaborative work.



B. Sc	Semester – V(Skill Enhancement Course- Elective)	Credits:4
Course :6A	Data Analytics with Tableau	Hrs/Wk:4

Learning Outcomes

Students at the successful completion of the course will be able to:

1. Understand Big Data and its usage
2. Identify various Data Quality and Preprocessing methods
3. Learn different Clustering techniques and Frequent Pattern Mining
4. Understand Regression, Classification and additional Predictive Methods

Syllabus: *(Total Hours: 90 including Teaching, Lab and internal exams, etc.)*

UNIT I:

Introduction to Data Analytics: Big Data and Data Science, Big Data Architectures, A Short Taxonomy of Data Analytics, Examples of Data Use, History on Methodologies for Data Analytics. Descriptive Statistics: Scale Types, Descriptive Univariate Analysis, Descriptive Bivariate Analysis.

UNIT II:

Descriptive Multivariate Analysis: Multivariate Frequencies, Multivariate Data Visualization, Multivariate Statistics, Infographics and Word Clouds Data Quality and Preprocessing: Data Quality, converting to a Different Scale Type, Converting to a Different Scale, Data Transformation, Dimensionality Reduction.

UNIT III:

Clustering: Distance Measures, Clustering Validation, Clustering Techniques.
Frequent Pattern Mining: Frequent Itemsets, Association Rules, Behind Support and Confidence, Other Types of Pattern.

UNIT IV:

Regression: Predictive Performance Estimation, Finding the Parameters of the Model, Technique and Model Selection.
Classification: Binary Classification, Predictive Performance Measures for Classification, Distance-based Learning Algorithms, Probabilistic Classification Algorithms.

UNIT V:

Additional Predictive Methods: Search-based Algorithms, Optimization-based Algorithms.
Advanced Predictive Topics: Ensemble Learning, Algorithm Bias, Non-binary Classification Tasks, Advanced Data Preparation Techniques for Prediction.

TEXT BOOKS:

1. "A General Introduction to Data Analytics" by João Mendes Moreira, André C. P. L. F. de Carvalho, TomášHorváth, 2019 Edition, Wiley Publications.
2. "Data Analytics: Principles, Tools and Practices" by Dr. Gaurav Aroraa, ChitraLele, Dr. Munish Jindal, 2022 Edition, pbp publications
3. "Data Analytics" by Anil Maheshwari, First Edition, McGraw Hill Education



B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 6A	Data Analytics With Tableau Lab	Hrs/Wk:2

OBJECTIVES:

- To implement Map Reduce programs for processing big data
- To realize storage of big data using H base, Mongo DB
- To analyze big data using linear models
- To Analyse big data using machine learning techniques such as SVM / Decision tree classification and clustering

LIST OF EXPERIMENTS

Hadoop

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

R

1. Implement Linear and logistic Regression
2. Implement SVM / Decision tree classification techniques
3. Implement clustering techniques
4. Visualize data using any plotting framework
5. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.

TEXT BOOKS:

1. “A General Introduction to Data Analytics” by João Mendes Moreira, André C. P. L. F. de Carvalho, TomášHorváth, 2019 Edition, Wiley Publications.
2. “Data Analytics: Principles, Tools and Practices” by Dr. Gaurav Aroraa, ChitraLele, Dr. Munish Jindal, 2022 Edition, pbp publications.
3. “Data Analytics” by Anil Maheshwari, First Edition, McGraw Hill Education



B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:7A	AI Concepts and Techniques with Python	Hrs/Wk:4

Aim and objectives of Course :

- This course provides an introduction to the fundamentals of artificial intelligence. Demonstrates fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- Demonstrates awareness and a fundamental understanding of various applications of AI techniques in intelligent Agents.

Learning outcomes of Course:

- List the objectives and functions of modern Artificial Intelligence.
- Categorize an AI problem based on its characteristics and its constraints.
- Understand and implement search algorithms.
- Learn how to analyze the complexity of a given problem and come with suitable optimizations.
- Demonstrate practical experience by implementing and experimenting with the learnt algorithms.

Syllabus: (Total Hours: 90 including Teaching, Lab and internal exams, etc.)

UNIT I:

Problems and Search: What is Artificial Intelligence, The AI Problems, and Underlying Assumption, what is an AI Technique.

Problems, Problems Spaces, and Search: Defining the problem as a state space search, production systems, problems characteristics, issues in the design of search programs.

UNIT II:

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis

UNIT III:

Knowledge Representation Issues: Representations and Mapping, Approaches to Knowledge Representation, The frame problem. Using Predicate Logic: Representing simple facts in logic, Representing Isa relationships, predicates, Resolution

UNIT IV:

Representing Knowledge using Rules: Procedural Vs Declarative knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge

UNIT V:

Symbolic Reasoning under Uncertainty: Introduction to Non-monotonic Reasoning, Logics for Non-monotonic Reasoning, Implementation issues, Augmenting a Problem solver, implementation: DFS, BFS.

Statistical Reasoning: Probability and Bayes Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory.



TEXT BOOK:

1. Artificial Intelligence, Second Edition, Elaine Rich, Kevin Knight, Tata McGraw-Hill Edition.

REFERENCES BOOK:

1. Russell, S., &Norvig, P. Artificial intelligence: a modern approach. Third Edition. Pearson new International edition. 2014.



B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 7A	AI Concepts and Techniques with Python Lab	Hrs/Wk:2

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman problem using Python.
7. Write a Program to Implement Towers of Hanoi problem using Python.
8. Write a Program to implement 8-Queens problem using Python.



B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:6B	Supervised ML with Python	Hrs/Wk:4

Aim and objectives of Course:

- The purpose of this course is to serve as an introduction to Supervised machine learning with Python.
- We will explore several classifications, regression algorithms and see how they can help us perform a variety of Supervised machine learning tasks.

Learning outcomes of Course:

- Able to understand introduction to machine learning concepts.
- Able to Loading datasets, build models and model persistence.
- Understand Feature extraction from data sets.
- Able to do Regression & Classification.
- Able to compare SVM with other classifiers.

Syllabus: (Total Hours: 90 including Teaching, Lab and internal exams, etc.)

UNIT I:

Machine Learning Basics: What is machine learning? Key terminology, Key tasks of machine learning, How to choose right algorithm, steps in developing a machine learning, why python? Getting started with Numpy library
Classifying with k-Nearest Neighbors: The k-Nearest Neighbors classification algorithm, Parsing and importing data from a text file, Creating scatter plots with Matplotlib, Normalizing numeric values

UNIT II:

Splitting datasets one feature at a time-Decision trees: Introducing decision trees, measuring consistency in a dataset, using recursion to construct a decision tree, plotting trees in Matplotlib

UNIT III:

Classifying with probability theory-Naïve Bayes: Using probability distributions for classification, learning the naïve Bayes classifier, Parsing data from RSS feeds, using naïve Bayes to reveal regional attitudes

UNIT IV:

Logistic regression: Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients, the gradient descent optimization algorithm, Dealing with missing values in the our data

UNIT V:

Support vector machines: Introducing support vector machines, using the SMO algorithm for optimization, using kernels to “transform” data, Comparing support vector machines with other classifiers

TEXT BOOK:

1. Machine learning in action, Peter Harrington by Manning publications



B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 6B	Supervised ML with Python Lab	Hrs/Wk:2

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm.
4. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a CSV file.
5. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
7. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
8. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.



B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:7B	Unsupervised ML with Python	Hrs/Wk:4

Aim and objectives of Course (Unsupervised ML with Python):

- Unsupervised Machine Learning involves finding patterns in datasets.
- The core of this course involves study of Clustering, feature extraction and optimization algorithms.
- The purpose of this course is to serve as an introduction to machine learning with Python.

Learning outcomes of Course:

- Able to do Clustering, feature extraction and optimization.
- Students will be able to understand and implement in Python algorithms of Unsupervised
- Machine Learning and apply them to real-world datasets.

Syllabus: (Total Hours: 90 including Teaching, Lab and internal exams, etc.)

UNIT I:

Unsupervised Learning: Clustering: k-means clustering algorithm, Improving cluster performance with post processing, Bisecting k-means, Example: clustering points on a map

UNIT II:

Association analysis : Apriori algorithm: Association analysis, The Apriori principle, Finding frequent item sets with the Apriori algorithm, Mining association rules from frequent item sets, uncovering patterns in congressional voting

UNIT III:

Finding frequent item sets: FP-growth –FP trees, Build FP-tree, mining frequent from an FP-tree, finding co-occurring words in a Twitter feed, mining a click stream from a news site.

UNIT IV:

Principal component analysis: Dimensionality reduction techniques, using PCA to reduce the dimensionality of semiconductor manufacturing data

UNIT V:

Singular value decomposition: Applications of the SVD, Matrix factorization, SVD in Python, Collaborative filtering–based recommendation engines, a restaurant dish recommendation engine

TEXT BOOK:

1. Machine learning in action, Peter Harrington by Manning publications



B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 7B	Unsupervised ML with Python Lab	Hrs/Wk:2

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Implementation of K-Means Clustering
2. Implement the bisecting k-means clustering algorithm
3. Implement Apriori algorithm
4. Implement Association rule-generation functions
5. Implement FP-tree creation
6. Write a function to find all paths ending with a given item.
7. Implement Code to access the Twitter Python library
8. Implement the PCA algorithm
9. Write a program to find Rating estimation by using the SVD
10. Implement Image-compression functions using SVD.



B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:6C	NLP with Python	Hrs/Wk:4

Aim and Objectives of Course:

This course introduces the fundamental concepts and techniques of natural language processing (NLP). Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information. The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

Learning outcomes of Course:

- Able to describe the fundamental concepts and techniques of natural language processing.
- Ability to distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each.
- Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.
- Analyze large volume text data generated from a range of real-world applications.
- Understanding semantics and pragmatics of English language for processing
- Writing programs in Python to carry out natural language processing

Syllabus: (Total Hours: 90 including Teaching, Lab and internal exams, etc.)

UNIT I:

Natural Language Processing: What is NLP? NLP and linguistics -Syntax and semantics, Pragmatics and context, Two views of NLP, Tasks and super tasks. Linguistic tools- Sentence delimiters and tokenizers, Stemmers and taggers, Noun phrase and name recognizers, Parsers and grammars.

UNIT II:

Document Retrieval: Information retrieval, Indexing technology Query processing: Boolean search, Ranked retrieval, Probabilistic retrieval, Language modeling Evaluating search engines: Evaluation studies Evaluation Metrics Relevance Judgments Total system evaluation Attempts to enhance search performance: Table of contents Query expansion and thesauri, Query expansion from relevance information

UNIT III:

Information extraction: The Message Understanding Conferences, Regular expressions Finite automata in FASTUS: Finite State Machines and regular languages, Finite State Machines as parsers Pushdown automata and context-free grammars: Analyzing case reports Context free grammars Parsing with a pushdown automaton, Coping with incompleteness and ambiguity

UNIT IV:

Text categorization: Overview of categorization tasks and methods , Handcrafted rule based methods Inductive learning for text classification : Naïve Bayes classifiers , Linear classifiers, Decision trees and decision lists Nearest Neighbor algorithms Combining classifiers : Data fusion, Boosting, Using multiple classifiers



UNIT V:

Text mining: What is text mining? Reference and coreference, Named entity recognition, The coreference task, Automatic summarization: Summarization tasks, Constructing summaries from document fragments, Multi-document summarization (MDS) Testing of automatic summarization programs: Evaluation problems in summarization research, Building a corpus for training and testing.

TEXT BOOK:

1. Natural Language Processing for Online Applications, Text Retrieval Extraction & Categorization. Peter Jackson, Isabelle Moulinier, Thomson Legal & Regulatory.



B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course:6C	NLP with Python Lab	Hrs/Wk:2

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. INSTALLATION
2. WORD TOKENIZER
3. SENTENCE TOKENIZER
4. PARAGRAPH TOKENIZER
5. PROBABILISTIC PARSING
6. PROBABILISTIC CONTEXT FREE GRAMMER
7. LEARNING GRAMMAR
8. CONDITIONAL FREQUENCY DISTRIBUTIONS
9. LEXICAL ANALYSER
10. WORDNET
11. CONTEXT FREE GRAMMAR
12. LARGE CONTEXT FREE GRAMMAR AND PARSING
13. NAMED ENTITY RECOGNITION

TEXT BOOK:

1. Natural Language with Python, Steven Bird and O'Reilly , First Edition.



B. Sc	Semester – V(Skill Enhancement Course- Elective)	Credits:4
Course:7C	Deep Learning Neural Networks With Python	Hrs/Wk:4

Aim and Objectives of Course:

Deep learning has resurged with the availability of massive datasets and affordable computing, enabling new applications in computer vision and natural language processing. This course introduces convolutional, recurrent, and other neural network architectures for deep learning. Students design, implement, and train these models to solve real-world problems.

Learning outcomes of Course:

- Solve problems in linear algebra, probability, optimization, and machine learning.
- The advantages and disadvantages of deep learning neural network architectures and other approaches.
- Implement deep learning models in Python using the PyTorch library and train them with real-world datasets.
- Design convolution networks for handwriting and object classification from images or video.
- Design recurrent neural networks with attention mechanisms for natural language classification, generation, and translation.

Syllabus: (Total Hours: 90 including Teaching, Lab and internal exams, etc.)

UNIT I:

Introduction to Deep Learning: Artificial intelligence, machine learning and deep learning, history of machine learning, Why deep learning? Why now?

The mathematical building blocks of neural networks: A first look at a neural network, Data representations for neural networks, The gears of neural networks: tensor operations, The engine of neural networks: gradient-based optimization.

UNIT II:

Getting started with neural networks: Anatomy of a neural network, Introduction to Keras, Setting up a deep-learning workstation, Classifying movie reviews: a binary classification Example, Classifying newswires: a multiclass classification example, Predicting house prices: a regression example.

Fundamentals of machine learning: Four branches of machine learning, Evaluating machine-learning models, Data preprocessing, feature engineering and feature learning, Overfitting and underfitting, The universal workflow of machine learning.

UNIT III:

Deep learning for computer vision: Introduction to convnets, Training a convnet from scratch on a small dataset, Using a pretrained convent, Visualizing what convnets learn.

UNIT IV:

Deep learning for text and sequences: Working with text data, Understanding recurrent neural networks, Advanced use of recurrent neural networks, Sequence processing with convnets.

UNIT V:

Advanced deep-learning best practices: Going beyond the Sequential model: theKeras functional API, Inspecting and monitoring deep-learning models using Keras callbacks and Tensor Board, Getting the most out of your models.



TEXT BOOKS:

1. "Deep Learning with Python" by Francois Chollet, , 2018 Edition, Manning Publications.
2. "Deep Learning with Python" by Nikhil Ketkar, JojoMoolayil, Second Edition, Apress.
3. "Python Deep Learning" by Ivan Vasilev, Daniel Slatter, Second Edition, Packt Publications.



B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course:7C	Deep Learning Neural Networks With Python Lab	Hrs/Wk:2

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. How to train a network using Keras in Python
2. Write programs to demonstrate Tensor Operations
3. Classifying movie reviews: a binary classification example
4. Predicting house prices: a regression example
5. Demonstrate Convnets by the following tasks
 - i. Instantiating a Convnet
 - ii. Adding classifier on top of the Convnet
 - iii. Training the Convnet on MNIST images
6. Display curves of loss and accuracy during training
7. Word level one-hot encoding (Toy example)
8. Character level one-hot encoding (Toy example)
9. Using Keras for Word level one-hot encoding
10. Word level one-hot encoding with hashing trick

TEXT BOOKS:

1. "Deep Learning with Python" by Francois Chollet, , 2018 Edition, Manning Publications.



B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 4
Course: 6A	Operations Research - I	Hrs/Wk: 4

Objective: The Objective of the paper is to introduce the basic concepts of Operational Research and linear programming to the students.

Learning Outcomes:

After learning this course, the student will be able

1. To know the scope of Operations Research
2. To link the OR techniques with business environment and life sciences
3. To convert real life problems into mathematical models
4. To find a solution to the problem in different cases
5. To inculcate logical thinking to find a solution to the problem

Syllabus

UNIT I:

Introduction of OR – Origin and development of OR – Nature and features of OR –Scientific Method in OR – Modeling in OR – Advantages and limitations of Models-General Solution methods of OR models – Applications of Operation Research. Linear programming problem (LPP) - Mathematical formulation of the problem - illustrations on Mathematical formulation of Linear programming of problem. Graphical solution of linear programming problems. Some exceptional cases - Alternative solutions, Unbounded solutions, non-existing feasible solutions by Graphical method.

UNIT II:

General linear programming Problem (GLP) – Definition and Matrix form of GLP problem, Slack variable, Surplus variable, unrestricted Variable, Standard form of LPP and Canonical form of LPP. Definitions of Solution, Basic Solution, Degenerate Solution, Basic feasible Solution and Optimum Basic Feasible Solution. Introduction to Simplex method and Computational procedure of simplex algorithm. Solving LPP by Simplex method (Maximization case and Minimization case)

UNIT III:

Artificial variable technique - Big-M method and Two-phase simplex method, Degeneracy in LPP and method to resolve degeneracy. Alternative solution, Unbounded solution, Non existing feasible solution and Solution of simultaneous equations by Simplex method.

UNIT IV:

Duality in Linear Programming –Concept of duality - Definition of Primal and Dual Problems, General rules for converting any primal into its Dual, Economic interpretation of duality, Relation between the solution of Primal and Dual problem (statements only). Using duality to solve primal problem. Dual Simplex Method.

UNIT V:

Post Optimal Analysis - Changes in cost Vector C , Changes in the Requirement Vector b and changes in the Coefficient Matrix A . Structural Changes in a LPP.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

REFERENCE BOOKS:

1. S.D. Sharma, Operations Research, KedarNath Ram Nath& Co, Meerut.
2. KantiSwarup, P.K.Gupta, Manmohn, Operations Research, Sultan Chand and sons, New Delhi.
3. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
4. GassS.I : Linear Programming. Mc Graw Hill.
5. HadlyG : Linear programming. Addison-Wesley.
6. Taha H.M: Operations Research: An Introduction : Mac Millan.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 1
Course: 6A	Operations Research - I Lab	Hrs/Wk: 2

Practical/Lab to be performed on a computer using OR/Statistical packages

1. To solve Linear Programming Problem using Graphical Method with
 - (i) Unbounded solution
 - (ii) Infeasible solution
 - (iii) Alternative or multiple solutions.
2. Solution of LPP with simplex method.
3. Problem solving using Charnes-M method.
4. Problem solving using Two Phase method.
5. Illustration of following special cases in LPP using Simplex method
 - (i) Unrestricted variables
 - (ii) Unbounded solution
 - (iii) Infeasible solution
 - (iv) Alternative or multiple solutions.
6. Problems based on Principle of Duality.
7. Problems based on Dual simplex method.
8. Problems based on Post Optimal Analysis.

Practical's Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Solve LPP using Graphical method
2. Solve the LPP using Simplex method, Big M method and Two Phase method
3. Solve the problems using principle of duality
4. Solve the Problems using Dual Simplex method
5. Solve the problems for Post Optimal Analysis

Co-Curricular Activities:

a) Mandatory:

1. For Teacher:

Teacher shall train students in the following skills for 15 hours, by Taking relevant outside data (Field/Web).

1. To Solve the LPP using Graphical method
2. To Solve the LPP using Simplex method, Big M method and Two Phase Methods
3. To solve the LPP using Dual Simplex method

2. For Student: Fieldwork; Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.

1. Collecting the data and to perform OR techniques-Simplex method
(or)
2. Collecting the data and and to conduct post optimal analysis



3. Max.marks for Field WorkReport:05.

4. **Suggested Format for Fieldwork Report:** Titlepage, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

5. Unittests(IE).

b) **Suggested Co-Curricular Activities:**

1. Assignments/collectionofdata,Seminar,Quiz,Groupdiscussions/Debates
2. Visits any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 4
Course: 7A	Operations Research - II	Hrs/Wk: 4

Objective: To enrich the knowledge of students with advanced techniques of linear programming problem along with real life applications.

Learning Outcomes:

After learning this course, the student will be able

1. To solve the problems in logistics
2. To find a solution for the problems having space constraints
3. To minimize the total elapsed time in an industry by efficient allocation of jobs to the suitable persons.
4. To find a solution for an adequate usage of human resources
5. To find the most plausible solutions in industries and agriculture when a random environment exists.

Syllabus

UNIT I:

Transportation Problem - Introduction, Mathematical formulation of Transportation problem. Initial Basic feasible solution of Transportation problem - North-West corner rule, Lowest cost entry method, Vogel's approximation method. Method of finding optimal solution-MODI method(U-V method). Degeneracy in transportation problem, Resolution of degeneracy, Unbalanced transportation problem. Maximization TP.Transshipment Problem.

UNIT II:

Assignment Problem - Introduction, Mathematical formulation of Assignment problem, Reduction theorem (statement only), Hungarian Method for solving Assignment problem, Unbalanced Assignment problem. The Traveling salesman problem, Formulation of Traveling salesman problem as an Assignment problem and Solution procedure.

UNIT III:

Sequencing problem: Introduction and assumptions of sequencing problem, Sequencing of n jobs and one machine problem. Johnson's algorithm for n jobs and two machines problem- problems with n-jobs on two machines, algorithm for n jobs on three machines problem- problems with n-jobs on three machines, algorithm for n jobs on m machines problem, problems with n-jobs on m-machines.

UNIT IV:

Network Scheduling: Basic Components of a network, nodes and arcs, events and activities– Rules of Network construction – Time calculations in networks - Critical Path Method (CPM) and PERT.

UNIT V:

Game Theory: Two- person zero-sum games. Pure and Mixed strategies. Maxmin and Minimax Principles - Saddle point and its existence. Games without Saddle point-Mixed strategies.Solution of 2 x 2 rectangular games. Graphical method of solving 2 x n and m x 2 games. Dominance Property.



REFERENCE BOOKS:

1. S.D. Sharma, Operations Research, KedarNath Ram Nath& Co, Meerut.
2. KantiSwarup, P.K.Gupta, Manmohn, Operations Research, Sultan Chand and sons, New Delhi.
3. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
4. Gass: Linear Programming. Mc Graw Hill.
5. Hadly :Linrar programming. Addison-Wesley.
6. Taha : Operations Research: An Introduction : Mac Millan.
7. Dr.NVS Raju; Operations Research, SMS education,



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 1
Course: 7A	Operations Research - II Lab	Hrs/Wk: 2

Practical/Lab to be performed on a computer using OR/Statistical packages

1. IBFS of transportation problem by using North- West corner rule, Matrix minimum method and VAM
2. Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases)
3. Solution of Assignment problem using Hungarian method (both maximization and minimization cases),
4. Solution of sequencing problem—processing of n jobs through two machines
5. Solution of sequencing problem - processing of n jobs through three machines
6. To perform Project scheduling of a given project (Deterministic case-CPM).
7. To perform Project scheduling of a given project (Probabilistic case-PERT).
8. Graphical method of solving form $x \times 2$ and $2 \times n$ games.
9. Solution of $m \times n$ games by dominance rule.
10. Linear programming method for solving $m \times n$ games.

Practical's Skills Outcomes:

On successful completion of this practical course, students shall be able to:

1. Find IBFS by using North- West corner rule, Matrix minimum method and VAM
2. Find Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases)
3. Find Solution of Assignment problem using Hungarian method (both maximization and minimization cases),
4. Find Solution of sequencing problem—processing of n jobs through two machines and three machines
5. perform Project scheduling of a given project (Deterministic case-CPM) and (Probabilistic case-PERT).
6. Solve for $m \times 2$ and $2 \times n$ games using Graphical method
7. Find Solution of $m \times n$ games by dominance rule.
8. Solve $m \times n$ games by Linear programming method

Co-Curricular Activities:

a) Mandatory:

1. **For Teacher:** Teacher shall train students in the following skills for 15hours,by Taking relevant outside data(Field/Web).
 1. To find IBFS by using North- West corner rule, Matrix minimum method and VAM for the given Transportation Problem.
 2. To Find Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases).
 3. To find the Assignment of n jobs to n persons using Hungarian method



4. To find processing of n jobs through two machines and three machines using Sequencing
 - a. Problem
5. To solve network problems using PERT and CPM techniques
6. To Solve form $x \times 2$ and $2 \times n$ games using Graphical method
7. To Find Solution of $m \times n$ games by dominance rule.
8. Solve $m \times n$ games by Linear programming method
2. **For Student: Fieldwork;** Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.
 1. Collecting the data and to perform OR techniques
 - (or)
 2. Visiting Transportation places and Companies
3. **Max.marks for Field WorkReport:05.**
4. **Suggested Format for Fieldwork Report:** Title page, Student Details, Index page, Step wise work-done, Findings, Conclusions and Acknowledgements.
5. **Unittests(IE).**

b) Suggested Co-Curricular Activities:

1. Assignments/collectionofdata,Seminar,Quiz,Groupdiscussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 4
Course: 6B	Statistical Process and Quality Control	Hrs/Wk: 4

Course Objectives: To understand the concept of quality, process control and product control using control chart techniques and sampling inspection plan. To have an idea about quality management, quality circles, quality movement and standardizations for quality.

Learning Outcomes:

After learning this course, the student will be able

1. To define 'quality' in a scientific way
2. To differentiate between process control and product control
3. To speak about quality awareness in industry
4. To pave a path to an industry to meet the standards
5. To effectively implement various plans to control the quality standards at various stages of an industry.

Syllabus

UNIT I:

Meaning of quality, concept of total quality management (TQM) and six-sigma, ISO, comparison between TQM and Six Sigma, Meaning and purpose of Statistical Quality Control (SQC), Seven Process Control Tools of Statistical Quality Control (SQC) (i) Histogram (ii) Check Sheet, (iii) Pareto Diagram (iv) Cause and effect diagram(CED), (v) Defect concentration diagram (vi) Scatter Diagram (vii) Control chart. (Only introduction of 7 tools is expected).

UNIT II:

Statistical basis of She whart control charts, use of control charts. Interpretation of control charts, Control limits, Natural tolerance limits and specification limits. Chance causes and assignable causes of variation, justification for the use of 3-sigma limits for normal distribution, Criteria for detecting lack of control situations:

- (i) At least one point outside the control limits
- (ii) A run of seven or more points above or below central line.

UNIT III:

Control charts for Variables: Introduction and Construction of \bar{X} and R chart and Standard Deviation Chart when standards are specified and unspecified, corrective action if the process is out of statistical control.

Control charts for Attributes: Introduction and Construction of p chart, np chart, C Chart and U charts when standards are specified and unspecified, corrective action if the process is out of statistical control.

UNIT IV:

Acceptance Sampling for Attributes: Introduction, Concept of sampling inspection plan, Comparison between 100% inspection and sampling inspection. Procedures of acceptance sampling with rectification, Single sampling plan and double sampling plan.

Producer's risk and Consumer's risk, Operating characteristic (OC) curve, Acceptable Quality Level (AQL), Lot Tolerance Fraction Defective (LTFD) and Lot Tolerance Percent Defective (LTPD), Average Outgoing Quality (AOQ) and Average Outgoing Quality Limit (AOQL), AOQ curve, Average Sample Number (ASN), Average Total Inspection (ATI).



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UNIT V:

Single Sampling Plan: Computation of probability of acceptance using Binomial and Poisson approximation, of AOQ and ATI. Graphical determination of AOQL, Determination of a single sampling plan by: a) lot quality approach b) average quality approach.

Double Sampling Plan: Evaluation of probability of acceptance using Poisson distribution, Structure of OC Curve, Derivation of AOQ, ASN and ATI (with complete inspection of second sample), Graphical determination of AOQL, Comparison of single sampling plan and double sample plan.

TEXT BOOKS:

1. **Montgomery, D. C. (2008):** Statistical Quality Control, 6thEdn., John Wiley, New York.
2. **ParimalMukhopadhyay:** Applied Statistics, New Central Book Agency.
3. **Goon A.M., Gupta M.K. and Das Gupta B. (1986):** Fundamentals of Statistics, Vol. II, World Press, Calcutta.
4. **S.C. Gupta and V.K. Kapoor:** Fundamentals of Applied Statistics – Chand publications.

REFERENCES:

1. **R.C. Gupta:** Statistical Quality Control.
2. **Duncan A.J. (1974):** Quality Control and Industrial Statistics, fourth edition D.B. Taraporewala Sons and Co. Pvt. Ltd., Mumbai.
3. **Grant, E. L. and Leavenworth (1980):** Statistical Quality Control, fifth edition, Mc-Graw Hill, New Delhi.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 1
Course: 6B	Statistical Process and Quality Control Lab	Hrs/Wk: 2

Practical/Lab to be performed on a computer using Statistical packages

1. Construction of \bar{X} and R Charts.
2. Construction of \bar{X} and σ Charts.
3. Construction of p Charts for fixed sample size.
4. Construction of p Charts for variable sample size.
5. Construction of np Charts.
6. Construction of C charts.
7. Construction of U charts.
8. Single sampling plan for attributes (OC Curve, Producer's and Consumer's risks, AOQ, AOQL, ATI).
9. Determination of single sampling plan by: a) lot quality approach b) average quality approach.
10. Double sampling plan for attributes (OC curve, AOQ, AOQL, ATI, ASN using Poisson distribution).

Practical's Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Construct Control Charts for Variables (\bar{X} bar, R and σ) charts using R.
2. Construct Control Charts for Attributes (p, np,c and u charts with fixed and varying sample sizes)
3. Draw (OC Curve, Producer's and Consumer's risks, AOQ, AOQL, ATI).for Single sampling plan for attributes
4. Determination of single sampling plan by: a) lot quality approach b) average quality approach.
5. Draw (OC curve, AOQ, AOQL, ATI, ASN using Poisson distribution). For Double Sampling Plan for attributes
6. Determine single sampling plan by: a) lot quality approach b) average quality approach.

Co-Curricular Activities:

a) Mandatory:

1. **For Teacher:** Teacher shall train students in the following skills for 15 hours, by Taking relevant outside data (Field/Web).
 1. Construct Control Charts for Variables (\bar{X} bar, R and σ) charts for the data Construct Control Charts for Attributes (p, np,c and u charts with fixed and varying sample sizes) for the data
 2. Draw (OC Curve, Producer's and Consumer's risks, AOQ, AOQL, ATI).for Single sampling plan for attributes.
 3. Determination of Single sampling Plan and Double Sampling plan for the data
2. **For Student: Fieldwork;** Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.
 1. Collecting the data and construct Control charts for Variables and Control charts for Attributes
(or)
 2. Collecting the data and construct OC curve, producers risk, consumers risk, AOQ, AOQL and ATI for single and Double sampling Plans



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3. Max. marks for Field Work Report:05.
4. Suggested Format for Field work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
5. Unittests(IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 4
Course: 7B	Computational Techniques and R Programming	Hrs/Wk: 4

Course Objectives: To learn the statistical analysis with the help of the statistical software R

Learning Outcomes:

After learning this course the student will be able

1. Know about basics of computer
2. Know about Organization of digital computers
3. Know about Computer Programming and flow charts
4. Know and study about R Programming
5. Know about the usage of R in Descriptive Statistics

Syllabus

UNIT I:

Computer basics; Introduction and brief history of evolution of computers, Classification of computers: special purpose and general purpose; analog, digital and hybrid; Super, main-frame etc.

UNIT II:

Organization of general purpose digital computers: CPU, main memory and peripherals. Mass storage devices and other I/O devices. Computer languages: Machine code language (machine language), assembly language and high level languages. Software: Operating systems, linker, loader, compiler, interpreter and assembler.

UNIT III:

Computer programming: Algorithm and flow-chart. Storage of information: concepts of records and files. File organization: sequential, relative and indexed.

UNIT IV:

Programming with R: Introduction to R, Data types in R (numeric, logical, character, complex etc.), R objects: vector, matrix, array, list, data frame, factor, and time series. Arithmetic, logical and relational operators, explicit and implicit looping, functions and functional programming in R, Lexical scoping rules in R, benefits of Lexical scoping, other scoping rules, debugging facility in R. Few important mathematical, statistical and graphical functions in R.

UNIT V:

Descriptive Statistics with R software: : Calculations with R software such as descriptive statistics, frequency distribution, Graphics and plots, statistical functions of central tendency, variation, skewness and kurtosis and illustration with examples.

REFERENCE BOOKS:

1. Chambers, J. (2008). Software for Data Analysis: Programming with R, Springer.
2. Crawley, M.J. (2017). The R Book, John Wiley & Sons.
3. Eckhouse, R.H. and Morris, L.R. (1975). Minicomputer Systems Organization, Programming and Applications, Prentice-Hall.
4. Matloff, N. (2011). The Art of R Programming, No Starch Press, Inc.
5. Peter N. (1986). Inside the IBM PC, Prentice-Hall Press.



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6. Dr. Mark Gardener(2012): Beginning R The statistical Programming Languages, John Wiley & Sons.
7. Sudha G. Purohit, SharadD.Gore, and ShailajaR.Deshmukh (2008), Statistics Using R, Narosa Publishing House, India.
8. Crawley, M.J. (2006). Statistics – An introduction using R. John Wiley London.
9. Purohit, S.G., Deshmukh, S.R. and Gore, S.D., (2015): Statistics using R, Alpha Science International.
10. Verzani, J., (2018): Using R for introductory statistics. CRC press.
11. Schumacker, R.E., (2014): Learning statistics using R. Sage Publications.
12. Michale J. Crawley (2009), THE R BOOK, John Wiley & Sons.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 1
Course: 7B	Computational Techniques and R Programming Lab	Hrs/Wk: 2

Practical/Lab to be performed on a computer using R Software

1. Data visualization using R - frequency polygon, Ogives, Histogram.
2. Data visualization using R - simple and multiple bar diagram, pie chart.
3. Computation of Descriptive Statistics using R - Central Tendencies, Dispersions, Moments, Skewness and Kurtosis.
4. Computation of Karl Pearson's Coefficient of Correlation and Rank Correlation using R.
5. Construction of Control Charts for variables (\bar{X} , R and σ) charts using R.
6. Construction of Control Charts for attributes (p, np charts with fixed and varying sample sizes) using R.
7. Construction of Control Charts using R - C and U charts.

Practical's Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Draw frequency polygon, ogives, Histogram, Simple and multiple bar diagrams and Pie chart using R
2. Compute Descriptive statistics using R
3. Compute Coefficient of Correlation and Rank Correlation using R
4. Construct Control Charts for Variables (\bar{X} , R and σ) charts using R.
5. Construct Control Charts for Attributes (p, np charts with fixed and varying sample sizes) using R.
6. Construction of Control Charts using R - C and U charts.

Co-Curricular Activities:

a) Mandatory:

1. **For Teacher:** Teacher shall train students in the following skills for 15hours, by Taking relevant outside data(Field/Web).
 1. To draw Frequency Polygon, Histogram, Ogives, bar diagrams and pie charts using R for the collected data.
 2. To calculate Descriptive Statistics using R for the data.
 3. To calculate Correlation coefficient and rank correlation coefficient using R for the collected data.
 4. To Construct Control charts for Variables and Attributes using R for the data
2. **For Student: Fieldwork;** Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.
 1. Collecting the data and construct charts-Histogram, bar diagrams and pie chart, and to calculate Descriptive statistics, Correlation, Rank correlation for the collected data using R

(or)

 2. Collecting the data and construct Control charts for Variables and Control charts for Attributes using R



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3. **Max.marks for Field WorkReport:05.**
4. **Suggested Format for Field work Report:** Title page, Student Details, Index page, Step wise work-done, Findings, Conclusions and Acknowledgements.
5. Unittests(IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collectionofdata,Seminar,Quiz,Groupdiscussions/Debates
2. Visittoany specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 4
Course: 6C	Econometrics	Hrs/Wk: 4

Learning Outcomes:

The course on econometrics will primarily focus on the use of statistical modelling and the relevant analyses to economic data problems. After learning this course the student will be able

1. Various important econometric models and relevant model building concepts in econometrics
2. General linear models and estimation of inherent model parameters
3. Multicollinearity, its detection and consequences and related inferential aspects
4. some advanced concepts of generalised least squares estimation, autocorrelation, its consequences, detection and strategy for reducing autocorrelation,
5. Heteroscedasticity and its inherent concepts including its consequences, some inferential aspects on heteroscedasticity, practical aspects and real data illustration of the related problems.

Syllabus:

UNIT I:

Basic Econometrics: Nature of econometrics and economic data, concept of econometrics, steps in empirical economic analysis, econometric model, importance of measurement in economics, the structure of econometric data, cross section, pooled cross section, time series and paired data, simple regression models, two variable linear regression model, assumptions estimations of parameters.

UNIT II:

Models and Estimations: Gauss marcoff theorem, OLS estimations, partial and multiple correlations coefficients. The general linear model assumptions, estimation and properties of estimators, BLUEs, and tests of significance of estimators, R square and ANOVA.

UNIT III:

Problems in OLS Estimators: Multicollinearity: Introduction and concepts, detection of multicollinearity, consequences, tests and solutions of multicollinearity.

UNIT IV:

Autocorrelation: concept, consequences of auto correlated disturbances, detection and solution of autocorrelation.

UNIT V:

Heteroscedastic disturbances: Concepts, Consequences of heteroscedasticity. Tests and solutions of heteroscedasticity, specification error, Errors of measurement.

REFERENCES:

1. Gujarati, D. and Sangeetha, S. (2007). Basic Econometrics, 4th Edition, McGraw Hill Companies.
2. Johnston, J. (1972). Econometric Methods, 2nd Edition, McGraw Hill International.
3. Koutsoyiannis, A. (2004). Theory of Econometrics, 2nd Edition, Palgrave Macmillan Limited.
4. Maddala, G.S. and Lahiri, K. (2009): Introduction to Econometrics, 4th Edition, John Wiley & Sons.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 1
Course: 6C	Econometrics Lab	Hrs/Wk: 2

Practical/Lab to be performed on a computer using Statistical packages

1. Problems based on estimation of General linear model.
2. Testing of parameters of General linear model.
3. Forecasting of General linear model.
4. Problems concerning specification errors.
5. Problems related to consequences of Multicollinearity.
6. Diagnostics of Multicollinearity.
7. Problems related to consequences of Autocorrelation (AR(I)).
8. Diagnostics of Autocorrelation.
9. Estimation of problems of General linear model under Autocorrelation.
10. Problems related to consequences Heteroscedasticity.
11. Diagnostics of Heteroscedasticity.
12. Estimation of problems of General linear model under Heteroscedastic distance terms.

Practical's Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Solve the General Linear Model Problems, Testing of Parameters of General linear Model and forecasting of General linear model
2. Solve the problems concerning Specification errors
3. Solve the problems related to multicollinearity and its Diagnostics
4. Solve the problems related to Autocorrelation and its Diagnostics and to estimate problems of General linear model under Autocorrelation
5. Solve the problems related to Heteroscedasticity and its Diagnostics and to estimate problems of General linear model under Heteroscedasticity.

Co-Curricular Activities:

a) Mandatory:

1. **For Teacher:** Teachers shall train students in the following skills for 15 hours, by Taking relevant outside data (Field/Web).
 1. Solving the problems related to General Linear Problems
 2. Solving the problems related to Specification errors
 3. Solving the problems related to Multicollinearity
 4. Solving the problems related to Autocorrelation
 5. Solving the problems related to heteroscedasticity
2. **For Student: Fieldwork;** Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.
 1. Collecting the data and frame General linear model and draw the conclusions by solving it(or)
 2. Collecting the data and finding the relationship between the variables using Multicollinearity and to draw conclusions from it.



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3. **Max.marks for Field WorkReport:05.**
 4. **Suggested Format for Fieldwork Report:** Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
 5. Unittests(IE).
- b) Suggested Co-Curricular Activities:**
1. Assignments/collectionofdata, Seminar, Quiz, Groupdiscussions/Debates
 2. Visits to any specified areas for doing survey and data collection
 3. Invited lectures and presentations on related topics by experts in the specified area.



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 4
Course: 7C	Regression Analysis	Hrs/Wk: 4

Learning Outcomes:

After learning this course the student will be able

1. To know about correlation and regression techniques, the two very powerful tools in statistics,
2. To get an idea of Linear and Multiple Linear regression,
3. To learn about regression diagnostics, multicollinearity, residual plots and estimation and tests for regression coefficients.
4. To study concept of coefficient of determination and inference on partial and multiple correlation coefficients.
5. To learn the regression with qualitative independent and dependent variables by dummy variable technique.
6. To learn the selection of the best regression model.

Syllabus

UNIT I:

Correlation: Bivariate data, Scatter diagram and interpretation. Karl Pearson's correlation coefficient, Properties. Spearman's rank correlation coefficient, with ties and without ties, limits. Regression, difference between correlation and regression.

UNIT II:

Steps in Regression Analysis: Assumptions of regression models. Simple linear regression model, Estimation of regression parameters by least squares method (fitting of regression model), Interpretation of parameters. Concept of residual, Residual plots. Multiple linear regression: Estimation of regression parameters by least square method, Interpretation of parameters. Concept of coefficient of determination.

UNIT III:

Regressions with Qualitative Independent Variables: Dummy variable technique — Testing structural stability of regression models comparing two regressions, interaction effects, seasonal analysis.

UNIT IV:

Regressions with Qualitative Dependent Variables: Piecewise linear regression, use of dummy variables, regression with dummy dependent variables; The LPM, Logit, Probit and Tobit models — Applications.

UNIT V:

Best Model: Selecting 'Best' regression model. All possible regressions – R^2 , Adjusted R^2 , MS_{Res} , Mallows's statistic. Sequential selection – forward selection, backward elimination.



REFERENCES:

1. Draper, N. R. and Smith, H. (1998). Applied Regression Analysis. 3rd Edition. John Wiley.
2. Hosmer, D. W., Lemeshow, S. and Sturdivant R.X. (2013). Applied Logistic Regression, Wiley Blackwell.
3. Montgomery, D. C., Peck, E. A. and Vining, G. G. (2013). Introduction to Linear Regression Analysis. 5th Edition. Wiley.
4. Neter, J., Kutner, M. H., Nachtsheim, C.J. and Wasserman, W. (1996). Applied Linear Statistical Models, 4th Edition, Irwin USA.
5. Gujarati, D. and Sangeetha, S. (2007). Basic Econometrics, 4th Edition



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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

B. Sc	Semester: V (Skill Enhancement Course- Elective)	Credits: 1
Course: 7C	Regression Analysis Lab	Hrs/Wk: 2

Practical/Lab to be performed on a computer using Statistical packages

1. Correlation coefficient
2. Rank correlation Coefficient
3. Regression Lines
4. Linear Models
5. Structural stability
6. Selecting best regression model by R^2
7. Selecting best regression model by Adjusted R^2
8. Selecting best regression model by MS_{Res}
9. Selecting best regression model by Mallows's statistic
10. Selecting best regression model by forward selection
11. Selecting best regression model by backward elimination.

Practicals Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Calculate Correlation Coefficient, RankCorrelation Coefficient, Regression lines and Linear models for the data
2. Select best regression model by R^2 , Adjusted R^2 , MS_{Reg} , Mallows's Statistic
3. Select best regression model by forward selection and backward elimination

Co-Curricular Activities:

c) Mandatory:

1. **For Teacher:** Teachers shall train students in the following skills for 15 hours, by Taking relevant outside data (Field/Web).
 1. Solving the problems related to General Linear Problems
 2. Solving the problems related to Specification errors
 3. Solving the problems related to Multicollinearity
 4. Solving the problems related to Autocorrelation
 5. Solving the problems related to heteroscedasticity
2. **For Student: Fieldwork;** Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.
 1. Collecting the data and frame General linear model and draw the conclusions by solving it
(or)
 2. Collecting the data and finding the relationship between the variables using Multicollinearity and to draw conclusions from it.
3. **Max.marks for Field Work Report:05.**
4. **Suggested Format for Fieldwork Report:** Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
5. Unittests(IE).

d) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 6A	Web Interface Designing Technologies	Hrs/Wk: 4

Learning Outcomes: Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Gain knowledge about various components of a website.
3. Demonstrate skills regarding creation of a static website and an interface to dynamic website.
4. Learn how to install word press and gain the knowledge of installing various plugins to use in their websites.

Syllabus: (Total Hours: 90 including Teaching, Lab, and Field training, Unit tests etc.)

UNIT I: (10 hours)

HTML: Introduction to web designing, difference between web applications and desktop applications, introduction to HTML, HTML structure, elements, attributes, headings, paragraphs, styles, colours, HTML formatting, Quotations, Comments, images, tables, lists, blocks and classes, HTML CSS, HTML frames, file paths, layout, symbols, HTML responsive.

UNIT II: (10 hours)

HTML forms: HTML form elements, input types, input attributes, HTML5, HTML graphics, HTML media – video, audio, plug INS, you tube.

HTML APIs: Geo location, Drag/drop, local storage, HTML SSE.

CSS: CSS home, introduction, syntax, colours, back ground, borders, margins, padding, height/width, text, fonts, icons, tables, lists, position, over flow, float, CSS combinators, pseudo class, pseudo elements, opacity, tool tips, image gallery, CSS forms, CSS counters, CSS responsive.

UNIT III: (10 hours)

Client side Validation: Introduction to JavaScript - What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. Objects in JavaScript - Data and objects in JavaScript, regular expressions, exception handling. DHTML with JavaScript - Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images.

UNIT IV: (10 hours)

Word press: Introduction to word press, servers like wamp, bitnami e.tc, installing and configuring word press, understanding admin panel, working with posts and pages, using editor, text formatting with shortcuts, working with media-Adding, editing, deleting media elements, working with widgets, menus.

UNIT V: (10 hours)

Working with themes-parent and child themes, using featured images, configuring settings, user and user roles and profiles, adding external links, extending word press with plug-ins. Customizing the site, changing the appearance of site using css , protecting word press website from hackers.



REFERENCES

1. Chris Bates, Web Programming Building Internet Applications, Second Edition, Wiley (2007)
2. Paul S.WangSanda S. Katila, an Introduction to Web Design plus Programming, Thomson (2007).
3. Head First HTML and CSS, Elisabeth Robson, Eric Freeman, O'Reilly Media Inc.
4. An Introduction to HTML and JavaScript: for Scientists and Engineers, David R. Brooks. Springer, 2007
5. Schaum's Easy Outline HTML, David Mercer, McGraw Hill Professional.
6. Word press for Beginners, Dr.Andy Williams.
7. Professional word press, Brad Williams, David damstra, Hanstern.
8. Web resources:
 - a. <http://www.codecademy.com/tracks/web>
 - b. <http://www.w3schools.com>
 - c. <https://www.w3schools.in/wordpress-tutorial/>
 - d. <http://www.homeandlearn.co.uk>
9. Other web sources suggested by the teacher concerned and the college librarianincluding reading material.

Co-Curricular Activities

a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying the case study to build a website, designing the format, structure, menus, submenus etc for a website and finally to build a website.
2. **For Student:** Students shall (individually) search online and visit any of the agencies like hotels, hospitals, super bazaars, organizations, etc. where there is a need for a website and identify any one case study and submit a hand-written Fieldwork/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a firm or business to develop a website, identifying various business entities to be included in the website, identifying menu bar and content to be placed in their websites.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Projectwork Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of place visited, observations, findings andacknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Build a website with 10 pages for the case study identified.
2. Training of students by related industrial experts,
3. Assignments
4. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
5. Presentation by students on best websites.



B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 6A	Web Interface Designing Technologies Lab	Hrs/Wk: 2

Web Interface Designing Technologies – PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Create a basic website with the help of HTML and CSS.
2. Acquire the skill of installing word press and various plugins of Word press.
3. Create a static website with the help of Word press.
4. Create an interface for a dynamic website.
5. Apply various themes for their websites using Word press.

Practical (Laboratory) Syllabus: (30 hrs.)

HTML and CSS:

1. Create an HTML document with the following formatting options:
(a) Bold, (b) Italics, (c) Underline, (d) Headings (Using H1 to H6 heading styles), (e) Font (Type, Size and Color), (f) Background (Colored background/Image in background), (g) Paragraph, (h) Line Break, (i) Horizontal Rule, (j) Pre tag
2. Create an HTML document which consists of:
(a) Ordered List (b) Unordered List (c) Nested List (d) Image
3. Create a Table with four rows and five columns. Place an image in one column.
4. Using "table" tag, align the images as follows:



5. Create a menu form using html.
6. Style the menu buttons using css.
7. Create a form using HTML which has the following types of controls:

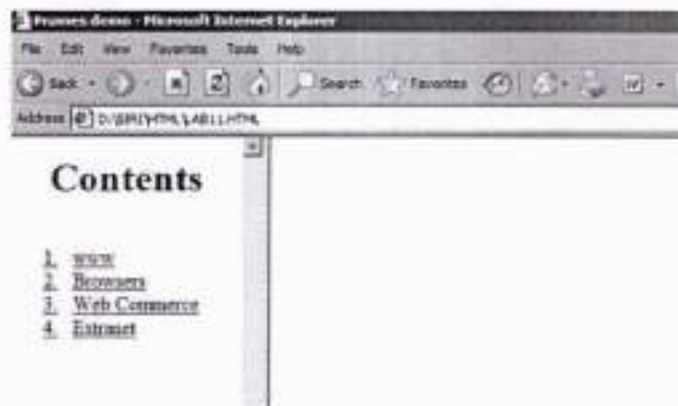


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- (a) Text Box (b) Option/radio buttons (c) Check boxes (d) Reset and Submit buttons
8. Embed a calendar object in your web page.
 9. Create an applet that accepts two numbers and perform all the arithmetic operations on them.
 10. Create nested table to store your curriculum.
 11. Create a form that accepts the information from the subscriber of a mailing system.
 12. Design the page as follows:



13. Create a help file as follows:



14. Create a webpage containing your bio data (assume the form and fields).
15. Write a html program including style sheets.
16. Write a html program to layers of information in web page.
17. Create a static webpage.



Word press:

1. Installation and configuration of word press.
2. Create a site and add a theme to it.20 Create a child theme
3. Create five pages on COVID – 19 and link them to the home page. .
4. Create a simple post with featured image.
5. Add an external video link with size 640 X 360.
6. Create a user and assign a role to him.
7. Create a login page to word press using custom links
8. Create a website for your college.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 7A	Web Applications Development using PHP& MYSQL	Hrs/Wk: 4

Learning Outcomes:

Students after successful completion of the course will be able to:

1. Write simple programs in PHP.
2. Understand how to use regular expressions, handle exceptions, and validate data using PHP.
3. Apply In-Built functions and Create User defined functions in PHP programming.
4. Write PHP scripts to handle HTML forms.
5. Write programs to create dynamic and interactive web based applications using PHP and MYSQL.
6. Know how to use PHP with a MySQL database and can write database driven webpages.

Syllabus: (Total Hours: 90 including Teaching, Lab, and Field training, Unit tests etc.)

UNIT I: (10 hours)

The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output. Working with Functions: What is function?, Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments.

UNIT II: (10 hours)

Working with Arrays: What are Arrays? Creating Arrays, Some Array-Related Functions. Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

UNIT III: (10 hours)

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and Working with File Uploads. Working with Cookies and User Sessions: Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session IDs in the Query String, Destroying Sessions and Unsetting Variables, Using Sessions in an Environment with Registered Users.

UNIT IV: (10 hours)

Working with Files and Directories: Including Files with include(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen(), Running Commands with exec(), Running Commands with system() or passthru().

Working with Images: Understanding the Image-Creation Process, Necessary Modifications to PHP, Drawing a New Image, Getting Fancy with Pie Charts, Modifying Existing Images, Image Creation from User Input.



UNIT V:

(10 hours)

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data. Creating an Online Address Book: Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism, Adding Sub-entities to a Record.

REFERENCES:

1. Julie C. Meloni, SAMS Teach yourself PHP MySQL and Apache, Pearson Education (2007).
2. Steven Holzner , PHP: The Complete Reference, McGraw-Hill
3. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition O'Reilly, 2014
4. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson(2006).
5. Web resources:
 - e. <http://www.codecademy.com/tracks/php>
 - f. <http://www.w3schools.com/PHP>
 - g. <http://www.tutorialpoint.com>
6. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) Mandatory: (Training of students by teacher in field related skills: (lab: 10 + field: 05) :

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on demonstrating various **interactive and dynamic websites** available online, addressing the students on identifying the case study to build an interactive and database driven website, forms to be used in website, database to be maintained, reports to be produced, etc.
2. **For Student:** Students shall (individually) search online and visit any of the agencies like malls, hotels, super bazaars, etc. where there is a need for an interactive and database driven website and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a firm or business to develop a website, identifying forms to be placed in the websites, back end databases to be maintained and reports to be generated and placed in the websites.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Projectwork Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of place or websites visited, structure of the website and acknowledgements.*
5. Unit tests (IE).



b) Suggested Co-Curricular Activities

1. Arrange expert lectures by IT experts working professionally in the area of web content development
2. Assignments (in writing or implementing contents related to syllabus or outside the syllabus. Shall be individual and challenging)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation by students on best websites.
5. Arrange a webpage development competition among small groups of students.



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B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 7A	Web Applications Development using PHP& MYSQL Lab	Hrs/Wk: 4

Web Applications Development using PHP & MYSQL~PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Write, debug and implement the Programs by applying concepts and error handling techniques of PHP.
2. Create an interactive and dynamic website.
3. Create a website with reports generated from a database.
4. Write programs to create an interactive website for e-commerce sites like online shopping, etc.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a PHP program to Display "Hello"
2. Write a PHP Program to display the today's date.
3. Write a PHP program to display Fibonacci series.
4. Write a PHP Program to read the employee details.
5. Write a PHP program to prepare the student marks list.
6. Write a PHP program to generate the multiplication of two matrices.
7. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
8. Create Website Registration Form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
9. Write PHP script to demonstrate passing variables with cookies.
10. Write a program to keep track of how many times a visitor has loaded the page.
11. Write a PHP application to add new Rows in a Table.
12. Write a PHP application to modify the Rows in a Table.
13. Write a PHP application to delete the Rows from a Table.
14. Write a PHP application to fetch the Rows in a Table.
15. Develop an PHP application to implement the following Operations
 - i. Registration of Users.
 - ii. Insert the details of the Users.
 - iii. Modify the Details.
 - iv. Transaction Maintenance.
 - a) No of times Logged in
 - b) Time Spent on each login.
 - c) Restrict the user for three trials only.
 - d) Delete the user if he spent more than 100 Hrs of transaction.
16. Write a PHP script to connect MySQL server from your website.
17. Write a program to read customer information like cust-no, cust-name, item- purchased, and mob-no, from customer table and display all these information in table format on output screen.
18. Write a program to edit name of customer to "Kiran" with cust-no =1, and to delete record with cust-no=3.
19. Write a program to read employee information like emp-no, emp-name, designation and salary from EMP table and display all this information using table format in your website.
20. Create a dynamic web site using PHP and MySQL.



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B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 6B	Internet of Things	Hrs/Wk: 4

Learning Outcomes: Students after successful completion of the course will be able to:

1. Appreciate the technology for IoT
2. Understand various concepts, terminologies and architecture of IoT systems.
3. Understand various applications of IoT
4. Learn how to use various sensors and actuators for design of IoT.
5. Learn how to connect various things to Internet.
6. Learn the skills to develop simple IOT Devices.

Syllabus: (Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)

UNIT I: (10 hours)
Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

UNIT II: (10 hours)
Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT III: (10 hours)
Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet And Modbus. IP Based Protocols for IoT IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT.Edge connectivity and protocols.

UNIT IV: (10 hours)
Arduino Simulation Environment: Arduino Uno Architecture, Setting up the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD.

Sensor & Actuators with Arduino: Overview of Sensors working, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensors with Arduino, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino.

UNIT V: (10 hours)
Developing IOT's: Implementation of IoT with Arduino, Connecting and using various IoT Cloud Based Platforms such as Blynk, Thingspeak, AWS IoT, Google Cloud IoT Core etc. Cloud Computing, Fog Computing, Privacy and Security Issues in IoT.



REFERENCES:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547
2. Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1st Edition, VPT, 2014
3. Daniel Minoli, — "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
4. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
5. Open source software / learning websites
 - a. <https://github.com/connectIOT/iottoolkit>
 - b. <https://www.arduino.cc/>
 - c. https://onlinecourses.nptel.ac.in/noc17_cs22/course
 - d. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
 - e. Contiki (Open source IoT operating system)
 - f. Ardudroid (open source IoT project)
 - g. <https://blynk.io> (Mobile app)
 - h. IoT Toolkit (smart object API gateway service reference implementation)
6. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

- a) Mandatory:** (*Training of students by teacher in field related skills: (lab: 10 + field: 05) :*
1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying the case study for the IoT, design an IoT solution, build physical IoT device, connect it to a mobile app and deploy the IoT device.
 2. **For Student:** Students shall (individually) search online and visit any of the places like aquaculture farms, agencies using IOT devices, etc to identify problems for IoT solution and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a Problem for IoT solution (agriculture, aquaculture, smart home appliances, testing moisture levels, oxygen levels, etc), reasons why IoT solution is feasible for the said problem, material required, Design and architecture for the proposed IoT device, method of implementation and how to connect the device to mobile.
 3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Projectwork Report: 05.
 4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of websites searched, place visited, observations, findings, proposed IOT problem, and design of the IOT device, implementation and acknowledgements.*
 5. Unit tests (IE).



b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Preparation and presentation of power-point slides, which include videos, animations, pictures, graphics, etc by the students.
4. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
5. Field visits to identify the problems for IoT solutions.



B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 6B	Internet of Things Lab	Hrs/Wk: 2

Internet of Things – PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Acquire the skills to design a small IoT device.
2. Connect various sensors, actuators, etc to Arduino board.
3. Connect the things to Internet
4. Design a small mobile app to control the sensors.
5. Deploy a simple IoT device.

Practical (Laboratory) Syllabus: (30 hrs)

1. Understanding Arduino UNO Board and Components
2. Installing and work with Arduino IDE
3. Blinking LED sketch with Arduino
4. Simulation of 4-Way Traffic Light with Arduino
5. Using Pulse Width Modulation
6. LED Fade Sketch and Button Sketch
7. Analog Input Sketch (Bar Graph with LEDs and Potentiometre)
8. Digital Read Serial Sketch (Working with DHT/IR/Gas or Any other Sensor)
9. Working with Adafruit Libraries in Arduino
10. Spinning a DC Motor and Motor Speed Control Sketch
11. Working with Shields
12. Design APP using Blink App or Things peak API and connect it LED bulb.
13. Design APP Using Blynk App and Connect to Temperature, magnetic Sensors.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 7B	Application Development using Python	Hrs/Wk: 4

Learning Outcomes: Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
3. Demonstrate proficiency in handling Strings and File Systems.
4. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
5. Interpret the concepts of Object-Oriented Programming as used in Python.
6. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

Syllabus: (Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)

UNIT I: (10 hours)

Python basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT II: (10 hours)

Files: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT III: (10 hours)

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT IV: (10 hours)

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

Web Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application, Advanced CGI, Web (HTTP) Servers



UNIT V: (10 hours)
Database Programming: Introduction, Python Database Application Programmer's Interface (DBAPI), Object Relational Managers (ORMs), Related Modules

REFERENCES:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Think Python, Allen Downey, Green Tea Press.
3. Introduction to Python, Kenneth A. Lambert, Cengage.
4. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
5. Learning Python, Mark Lutz, O' Really.
6. Web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) Mandatory: (Training of students by teacher in field related skills: (lab: 10 + field: 05)

1. **For Teacher:** Training of students by the teacher in laboratory/field for not less than 15 hours on field related skills like building an IOT device with the help of Python.
2. **For Student:** Students shall (individually) identify the method to link their IOT project done in Paper 7A with Python and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. It should include a brief report on the selected case study of IOT device, algorithm and Python program to operate the IOT device.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Projectwork Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, design of the IOT device, implementation of Python program to connect the IOT device, findings and acknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students on best websites.



B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 7B	Application Development using Python Lab	Hrs/Wk: 2

Application Development Using Python– PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Implement simple programs in Python
2. Implement programs related to various data structures like lists, dictionaries, etc.
3. Implement programs related to files.
4. Implement applications related to databases, Web services and IOT.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Write a python program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
Grade A: Percentage ≥ 80
Grade B: Percentage ≥ 70 and < 80
Grade C: Percentage ≥ 60 and < 70
Grade D: Percentage ≥ 40 and < 60
Grade E: Percentage < 40
3. Write a python program to display the first n terms of Fibonacci series.
4. Write a python program to calculate the sum and product of two compatible matrices.
5. Write a function that takes a character and returns True if it is a vowel and False otherwise.
6. Write a menu-driven program to create mathematical 3D objects
 - I. curve
 - II. sphere
 - III. cone
 - IV. arrow
 - V. ring
 - VI. Cylinder.
7. Write a python program to read n integers and display them as a histogram.
8. Write a python program to display sine, cosine, polynomial and exponential curves.
9. Write a python program to plot a graph of people with pulse rate p vs. height h. The values of P and H are to be entered by the user.
10. Write a python program to calculate the mass m in a chemical reaction. The mass



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B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

- m (in gms) disintegrates according to the formula $m=60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m, where $t \geq 0$.
11. A population of 1000 bacteria is introduced into a nutrient medium. The population grows as follows:
- $$P(t) = (15000(1+t)) / (15 + e^t)$$
12. Where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
13. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
- VII. velocity wrt time ($v=u+at$)
 - VIII. distance wrt time ($s=u*t+0.5*a*t*t$)
 - IX. distance wrt velocity ($s=(v*v-u*u)/2*a$)
14. Write a program that takes two lists and returns True if they have at least one common member.
15. Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements.
16. Write a program to implement exception handling.
17. Try to configure the widget with various options like: `bg="green"`, `family="times"`, `size=20`.
18. Write a Python program to read last 5 lines of a file.
19. Design a simple database application that stores the records and retrieve the same
20. Design a database application to search the specified record from the database.
21. Design a database application to that allows the user to add, delete and modify the records.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 6C	Data science	Hrs/Wk: 4

Learning Outcomes: Students after successful completion of the course will be able to:

1. Develop relevant programming abilities.
2. Demonstrate proficiency with statistical analysis of data.
3. Develop the ability to build and assess data-based models.
4. Demonstrate skill in data management
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

Syllabus: (Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)

UNIT I: (10 hours)

Introduction: The Ascendance of Data, What is Data Science? , Finding key Connectors, Data Scientists You May Know, Salaries and Experience, Paid Accounts, Topics of Interest, Onward.
Python: Getting Python, The Zen of Python, Whitespace Formatting, Modules, Arithmetic, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Generators and Iterators, Randomness, Object – Orienting Programming, Functional Tools, enumerate, zip and Argument Unpacking, args and kwargs, Welcome to Data Sciencester!

Visualizing Data: matplotlib, Bar charts, Line charts, Scatterplots.

Linear Algebra: Vectors, Matrices

UNIT II: (10 hours)

Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, some Other Correlation Caveats, Correlation and Causation.

Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem.

Hypothesis and Inference: Statistical Hypothesis Testing, Example: Flipping a Coin, Confidence Intervals, P-hacking, Example: Running an A/B Test, Bayesian Inference.

Gradient Descent: The Idea behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Putting It All Together, Stochastic Gradient Descent.

UNIT III: (10 hours)

Getting Data: stdin and stdout, Reading Files – The Basics of Text Files, Delimited Files, Scraping the Web - HTML and the parsing Thereof, Example: O'Reilly Books About Data, Using APIs – JSON (and XML), Using an Unauthenticated API, Finding APIs.

Working with Data: Exploring Your Data, Exploring One-Dimensional Data, Two Dimensions Many Dimensions, Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.

Machine Learning: Modeling, What Is Machine Learning? Over fitting and under fitting, Correctness, The Bias-Variance Trade-off, Feature Extraction and Selection



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UNIT IV: (10 hours)

K-Nearest Neighbors: The Model, Example: Favorite Languages, The Curse of Dimensionality.

Naive Bayes: A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model.

Simple Linear Regression: The Model, Using Gradient Descent, Maximum Likelihood Estimation.

Multiple Regression: The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit.

UNIT V: (10 hours)

Logistic Regression: The Problem, The Logistic Function, Applying the Model, Goodness of Fit Support Vector Machines.

Decision Trees: What Is a Decision Tree? Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests.

Neural Networks: Perceptron, Feed-Forward Neural Networks And Back propagation, Example: Defeating a CAPTCHA.

Clustering: The Idea, The Model, Example: Meetups , Choosing k, Example: Clustering Colors, Bottom-up Hierarchical Clustering.

REFERENCES:

1. Data Science from Scratch by Joel Grus O'Reilly Media
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.
4. Web resources:
 - a. <https://www.edx.org/course/analyzing-data-with-python>
 - b. [http://math.ecnu.edu.cn/~lfzhou/seminar/\[Joel_Grus\]_Data_Science_from_Scratch_First_Princ.pdf](http://math.ecnu.edu.cn/~lfzhou/seminar/[Joel_Grus]_Data_Science_from_Scratch_First_Princ.pdf)
5. 9. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) Mandatory: (Training of students by teacher in field related skills: (lab:10 + field: 05):

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying, analyzing and presenting the data and then to predict the future instances.
2. **For Student:** Students shall (individually) search online and visit any of the agencies like Statistical cell, weather forecasting centers, pollution control boards, manufacturing industries, agriculture departments, etc. to observe the manual process going on to collect the data, maintain the data, present the data and to predict the data for future instances and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Projectwork Report: 05.



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4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students in related topics.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 6C	Data science Lab	Hrs/Wk: 2

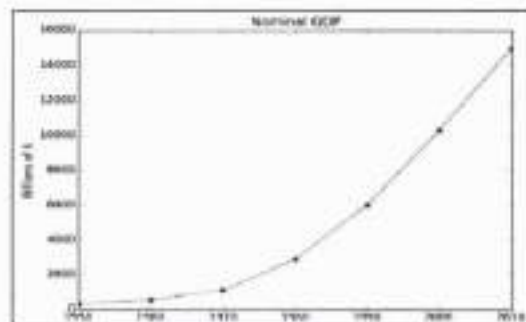
Course 6C: Data Science – PRACTICAL SYLLABUS

Learning Outcomes: On successful completion of this practical course, student shall be able to:

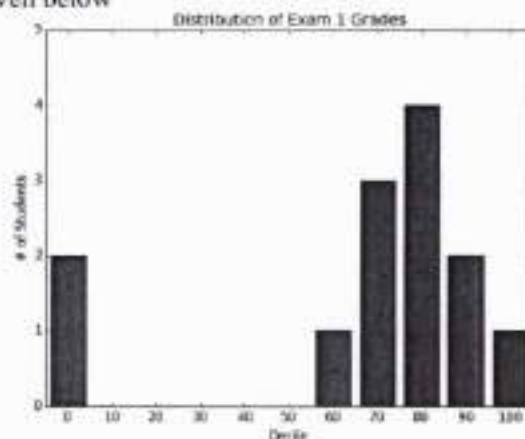
1. Apply data science solutions to real world problems.
2. Implement the programs to get the required data, process it and present the outputs using Python language.
3. Execute statistical analyses with Open source Python software.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a Python program to create a line chart for values of year and GDP as given below



2. Write a Python program to create a bar chart to display number of students secured different grading as given below



3. Write a Python program to create a time series chart by taking one year month wise stock data in a CSV file
4. Write a Python program to plot distribution curve
5. Import a CSV file and perform various Statistical and Comparison operations on rows/columns. Write a python program to plot a graph of people with pulse rate p vs. height h. The values of P and H are to be entered by the user.
6. Import rainfall data of some location with the help of packages available in R Studio and plot a chart of your choice.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f. 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 7C	Python for Data science	Hrs/Wk: 4

Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.
2. Design an application with user-defined modules and packages using OOP concept
3. Employ efficient storage and data operations using NumPy arrays.
4. Apply powerful data manipulations using Pandas.
5. Do data pre-processing and visualization using Pandas

Syllabus: (Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)

UNIT I: (10 hours)

Introduction to Data Science - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators, Decision Making- Looping- Loop Control statement- Math and Random number functions. User defined functions - function arguments & its types.

UNIT II: (10 hours)

User defined Modules and Packages in Python- Files: File manipulations, File and Directory related methods - Python Exception Handling, OOPs Concepts -Class and Objects, Constructors – Data hiding- Data Abstraction-Inheritance.

UNIT III: (10 hours)

NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes.
Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting- Unique and Other Set Logic.

UNIT IV: (10 hours)

Introduction to pandas Data Structures: Series, Data Frame and Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.
Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format

UNIT V: (10 hours)

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas.
Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.



REFERENCES:

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson, 2012.
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.
4. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2006.
5. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2009.
6. Web resources:
 - a. <https://www.edx.org/course/python-basics-for-data-science>
 - b. <https://www.edx.org/course/analyzing-data-with-python>
 - c. <https://www.coursera.org/learn/python-plotting?specialization=data-science-python>
 - d. <https://www.programmer-books.com/introducing-data-science-pdf/>
 - e. <https://www.cs.uky.edu/~keern/115/Haltermanpythonbook.pdf>
7. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab:10 + field: 05)*);

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on collecting the data, analyzing the data and presenting the data using Python language with some real time data.
2. **For Student:** Students shall (individually) visit any of the agencies like Agriculture dept, statistical cell, irrigation department, Ground water department, CPO office, Rural Water Supply and Sanitation department etc or search online to get real time data like Aids database, weather forecasting database, social networking data, etc and identify any one database, implement and present the necessary charts in Python language and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Identifying a database, get the data, present the data in required charts and to predict the future instances if possible.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work Report:05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, and details of place visited, observations, method of data collection, database identified, and implementation in Python language, other findings and acknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students on the topics within and outside the syllabus.



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 7C	Python for Data science Lab	Hrs/Wk: 2

Python for Data Science – PRACTICAL SYLLABUS

Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. Implement simple programs in Python.
2. Implement programs related to various structures like arrays, lists, Data frames, etc.
3. Implement programs related to files.
4. Implement applications related to data science.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set
2. Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem.
3. Handle numerical operations using math and random number functions
4. Create user-defined functions with different types of function arguments.
5. Create packages and import modules from packages.
6. Perform File manipulations- open, close, read, write, append and copy from one file to another.
7. Write a program for Handle Exceptions using Python Built-in Exceptions
8. Write a program to implement OOP concepts like Data hiding and Data Abstraction.
9. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.
10. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
11. Computation on NumPy arrays using Universal Functions and Mathematical methods.
12. Load an image file and do crop and flip operation using NumPy Indexing.
13. Create Pandas Series and Data Frame from various inputs.
14. Import any CSV file to Pandas Data Frame and perform the following:
 - (a) Visualize the first and last 10 records
 - (b) Get the shape, index and column details
 - (c) Select/Delete the records (rows)/columns based on conditions.
 - (d) Perform ranking and sorting operations.
 - (e) Do required statistical operations on the given columns.
 - (f) Find the count and uniqueness of the given categorical values.
 - (g) Rename single/multiple columns



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15. Import any CSV file to Pandas Data Frame and perform the following:
- (a) Handle missing data by detecting and dropping/ filling missing values.
 - (b) Transform data using apply () and map() method.
 - (c) Detect and filter outliers.
 - (d) Perform Vectorized String operations on Pandas Series.
 - (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.


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