



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

B.Sc.,

B.Sc., Mathematics, Computer Science, Artificial Intelligence & Robotics (MCsAIR)



SYLLABUS

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PRINCIPAL
Aditya Degree College
KAKINADA



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

M. CS. AIR

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																	
Yoga																	
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.DETAILS 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	1	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.
	1	Personality Development and Leadership (PDL)	English/Any Dept
		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	



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Sem	Course No	Course Name	Course Type (T/L/P)	Hrs/Week (Arts/Commerce & Science)	Credits (Arts/Commerce & Science)	Max. Marks Count/ Internal/Mid Assessment	Max. Marks (Sem-End)	
I	1	Differential Equations	T	5	4	25	75	
II	2	Three Dimensional Analytical Solid Geometry	T	5	4	25	75	
III	3	Abstract Algebra	T	5	4	25	75	
IV	4	Mathematics Real Analysis	T	5	4	25	75	
	5	Linear Algebra	T	5	4	25	75	
V	6A	Numerical Methods	T	5	4	25	75	
	7A	Mathematical Special Functions	T	5	4	25	75	
	OR							
	6B	Multiple integrals and Applications of Vector Calculus	T	5	4	25	75	
	7B	Integral transforms with Applications	T	5	4	25	75	
	OR							
	6C	Partial Differential Equations and Fourier Series	T	5	4	25	75	
	7C	Number theory	T	5	4	25	75	

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

Note 1: For Semester-V, for the domain subject **MATHEMATICS**, 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.

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



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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

- proposed combination subjects: NIL
- Student eligibility for joining in the course: NIL
- Faculty eligibility for teaching the course NIL
- List of Proposed Skill enhancement courses with syllabus, if any NIL
- Any newly proposed Skill development/Life skill courses with draft syllabus and required resources NIL

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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

Principals



DETAILS OF COURSES AND CREDITS

Sem	Course No	Course Name	Course Type (L/T/P)	Hrs/Week	Credits	Max. Marks	Max. Marks	
				Sciences:4+2	Sciences: 4+1	Internal/ Conti./ Mid Assessment	Sem- End Exam	
I	1	Web Technologies	T	4	4	25	75	
	2	Web Technologies Lab	L	2	1		50	
II	3	Artificial Intelligence	T	4	4	25	75	
	4	AI Using PROLOG Lab	L	2	1		50	
III	5	Expert System	T	4	4	25	75	
	6	Expert System using LISP Lab	L	2	1		50	
IV	7	Fundamentals of IoT and Robotics	T	4	4	25	75	
	8	IoT and Robotics Lab	L	2	1		50	
	9	Machine learning	T	4	4	25	75	
	10	ML Using Python lab	L	2	1		50	
V	6A	Artificial Neural Network	T	4	4	25	75	
		Linux Lab	L	2	1		50	
	7A	Neural Network And Fuzzy Logic	T	4	4	25	75	
		Advanced Python Lab	L	2	1		50	
	OR							
	6B	Cryptography And Network Security	T	4	4	25	75	
		Cryptography and Network Security Lab	L	2	1		50	
	7B	Cyber Security	T	4	4	25	75	
		Cyber Security Lab	L	2	1		50	
	OR							
	6C	Data Analytics Using R	T	4	4	25	75	
		R Lab	L	2	1		50	
	7C	Data Warehousing And Mining	T	4	4	25	75	
		Data Ware Housing and Mining Lab	L	2	1		50	
VI		Project Work						

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 - I	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-1

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 బెబ్బులి - 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, నుగాగమ,ద్విరుక్తటకారాదేశ, యణాదేశ, వృద్ధి, శ్చుత్వ, జ్జుత్వ, అనునాసిక సంధులు.

సమాసాలు: అవ్యయిభావ, తత్పురుష, కర్మధారయ, ద్వంద్వ, ద్విగు, ఐహుప్రీహి.

అలంకారాలు:

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

శబ్దాలంకారాలు : అనుప్రాస (వృత్తనుప్రాస, చేకామప్రాస లాటానుప్రాస, అంత్యానుప్రాస)

చందస్సు

వృత్తాలు: ఉత్పలమాల, చంపకమాల, శార్దూలము, మల్లేభము;

జాతులు : కందం, ద్విపద; ఉపజాతులు : అటవెలది, 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, Gorakhpur.
- UNIT – II MODERN POETRY:**1." Mevada Rajyastapanam" 4th Canto, Srimat 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.



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B.Sc/B.A/B.Com General HINDI Syllabus (w.e.f.2020-21 A.Y)

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

UNIT 1

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

1. साहित्य की महत्ता
2. मित्रता
- 3.पुश्पीराज की आँखें

UNIT 2

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

- 1.मुक्तिधन
- 2.गूदडसाई
- 3.उसने कहा था

UNIT 3

व्याकरण (Grammar)(सरल हिन्दी व्याकरण, दक्षिण भारत हिन्दी प्रचार सना, मद्रास)
लिंग, वचन, काल, याध्य।

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 विक्रेता के नाम पत्र

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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 (*SarvabhaumPyarvastha*) - 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. Sussan 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)
I	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

DETAILS OF COURSE-WISE SYLLABUS

B.A/ B.Sc	Semester-I	Credits:4
Course:I	DIFFERENTIAL EQUATIONS	Hrs/Week:5

Course Outcomes:

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

- Solve linear differential equations
- Convert non exact homogeneous equations to exact differential equations by using integrating factors
- Know the methods of finding solutions of differential equations of the first order but not of the first Degree.
- Solve higher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.
- Understand the concept and apply appropriate methods for solving differential equations.

UNIT I:

(12 Hours)

Differential Equations of first order and first degree:

Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors.

UNIT II:

(12 Hours)

Differential Equations of first order but not of the first degree:

Equations solvable for p ; Equations solvable for y ; Equations solvable for x ; Equations homogeneous in x and y ; Equations of the first degree in x and y – Clairaut's Equation.

UNIT III:

(12 Hours)

Higher order linear differential equations-I:

Solution of homogeneous linear differential equations of order n with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators. General Solution of $f(D)y=0$.

General Solution of $f(D)y=Q$ when Q is a function $1/f(D)$ is expressed as partial fractions of x .

P.I. of $f(D)y = Q$ when $Q = be^{ax}$

P.I. of $f(D)y = Q$ when Q is $b\sin ax$ or $b \cos ax$.

UNIT IV:

(12 Hours)

Higher order linear differential equations-II:

Solution of the non-homogeneous linear differential equations with constant coefficients.

P.I. of $f(D)y = Q$ when $Q = bx^k$

P.I. of $f(D)y = Q$ when $Q = e^{ax} V$, where V is a function of x .

P.I. of $f(D)y = Q$ when $Q = xV$, where V is a function of x .

of $f(D)y = Q$ when $Q = x^m V$, where V is a function of x .

UNIT V:

(12 Hours)

Higher order linear differential equations-III :

Method of variation of parameters; Linear differential Equations with non-constant coefficients(Solution when a part of CF is known method only); The Cauchy-Euler Equation, Legendre's linear equations.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.



TEXT BOOK :

1. Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition.

REFERENCE BOOKS :

1. A text book of Mathematics for B.A/B.Sc, Vol 1, by N. Krishna Murthy & others, published by S.Chand & Company, New Delhi.
2. Ordinary and Partial Differential Equations by Dr. M.D,Raisinghania, published by S. Chand & Company, New Delhi.
3. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha Universities Press.
4. Differential Equations -Srinivas Vangala & Madhu Rajesh, published by Spectrum University Press.



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.



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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: 1(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 refection of parameters in swapping of two integervales 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.

**DETAILS OF COURSE-WISE SYLLABUS**

B Sc	Semester: I	Credits: 04
Course: 1	WEB TECHNOLOGIES	Hrs/Wk:04

COURSE OBJECTIVES:

This subject enables the student to create flexible, attractive, user-friendly web sites comprised of both static and dynamic web pages.. Along with that students will also learn about interactions with web pages through JavaScript and host own web site on internet.

LEARNING OUTCOMES:

After Studying this subject students would have capability to make their own web site and host on internet. Also students would have enough knowledge about the technologies used in internet.

UNIT I :

HTML: Basic HTML Tags and Attributes, Document body, Text, Hyper links, Adding more Formatting, Lists, Tables, Grouping, Images. More HTML: Multimedia Objects, Frames, Forms, Headers.

UNIT II :

Cascading Style Sheets: Introduction, Syntax, Selectors, Background Cursors, Text Fonts, Lists, Tables, Box Model, Using Styles, Simple Examples, Creation of Own Styles, Properties And Values In Styles, Formatting Blocks of Information, Layers.

UNIT III :

Introduction to JavaScript: What is DHTML, JavaScript Basics, Variables, String Manipulations, Mathematical Functions, Statements, Operators, Arrays and Functions.

UNIT IV :

DHTML with JavaScript: Data Validation, Opening A New Window, Messages and Confirmations, Status Bar, Different Frames, Rollover Buttons, Moving Images.

UNIT V :

XML: Defining Data for Web Applications, Basic XML, Document Type Definition, Presenting XML, Document Object Model, Web Services

TEXT BOOKS:

1. Harvey M. Deitel and Paul J. Deitel, "Internet & World Wide Web How to Program", 4/e, Pearson Education.
2. Uttam Kumar Roy, WebTechnologies from Oxford University Press Student Activities.

Co-curricular Activities:

- We for Web – Students with right mix of skills are formed as groups to develop websites.
- Web Ninja- A platform to showcase creative websites developed by students to their peers.

Assessment Methods:

- Formal Examinations .
- Lab Practical Examination .
- Presentations .
- Simple Project.



ADIKAVI NANNAYA UNIVERSITY :: RAJAHMAHENDRAVARAM
B.Sc Artificial Intelligence & Robotics Syllabus (w.e.f: 2020-21 A.Y)

B Sc	Semester: I	Credits: 01
Course: 1	WEB TECHNOLOGIES LAB	Hrs/Wk:02

1. Design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags.
2. Create your class timetable using table tag.
3. Create a feedback form for your curriculum. Use textbox, text area, checkbox, radio button etc
4. Create a web page using frame. Divide the page into two parts with Navigation links on left hand side of page (width=20%) and content page on right hand side of page (width = 80%). On clicking the navigation Links corresponding content must be shown on the right hand side.
5. Write html code to develop a webpage having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background colour.
6. Create your resume using HTML tags. Experiment with colours, text, link, size and also other tags you studied.
7. Design a web page of your College Day Celebrations with an attractive background colour, text colour, images, font etc. Use CSS.
8. Use Inline CSS to format your resume that you created.
9. Use External CSS to format your class timetable as you created.
10. Use External, Internal, and Inline CSS to format web page of your start up.
11. Develop a JavaScript to display your admission details in the college.
12. Develop simple calculator for addition, subtraction, multiplication and division operation using JavaScript.
13. Create HTML page with JavaScript which takes integer number as input and tells whether the number is odd or even.
14. Create HTML page that contains form for registration of your participation in a hackathon. Use relevant fields for input data. Write a JavaScript code to combine and display the input information when the button is clicked.
15. Create a login form with id and password. Perform input validation.



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-సక్షత్రమాల 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 కళారూపాల 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. घनश्याम)

1. भूख हडताल
2. परमात्मा का कुत्ता
3. और वह पढ़ गई...

Unit 3

व्याकरण (Grammar) (सरल हिन्दी व्याकरण, दक्षिण भारत हिन्दी प्रचार समा.मद्रास)

संघि 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 Aswagosa, 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 Gurram 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 'A'	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course		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	Course Title	Hrs/ Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course	'A'	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. Wikiepedia 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.Tej - 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 'B'	Course Title	Hrs/Sem	Hrs/wk	Credits	Sem End Exam (2 Hrs)
II	Skill Development Course		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, TCMPF) (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 Lakshmi Kantham
8. Nurella Telugu Nataka Rangam – Prof. Modali Nagabhushana Sarma
9. Websites on Performing Arts.



B.A/ B.Sc	Semester-II	Credits:4
Course:2	THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY	Hrs/Weak:5

Course Outcomes:

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

1. get the knowledge of planes.
2. basic idea of lines, sphere and cones.
3. understand the properties of planes, lines, spheres and cones.
4. express the problems geometrically and then to get the solution.

UNIT I: (12hrs)

The Plane: Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

UNIT II: (12 hrs)

The Line :Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.

UNIT III: (12 hrs)

The Sphere :Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes;

UNIT IV: (12 hrs)

The Sphere and Cones : Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres. Limiting Points.
Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone;

UNIT V: (12 hrs)

Cones :Enveloping cone of a sphere; right circular cone: equation of the right circular cone with a given vertex, axis and semi vertical angle: Condition that a cone may have three mutually perpendicular generators; intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex.

Co-Curricular Activities (15 Hours)

Seminar/ Quiz/ Assignments/Three dimensional analytical Solid geometry and its applications/ Problem Solving.

TEXT BOOK :

1. Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, published by S. Chand & Company Ltd. 7th Edition.

REFERENCE BOOKS :

1. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, published by S. Chand & Company, New Delhi.
2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, published by Wiley Eastern Ltd., 1999.
3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.
4. Solid Geometry by B.Rama Bhupal Reddy, published by Spectrum University Press.



B Sc	Semester: II	Credits: 04
Course: 2	ARTIFICIAL INTELLIGENCE	Hrs/Wk:04

COURSE OBJECTIVES:

The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning.

LEARNING OUTCOMES:

Students will acquire a fundamental understanding of the principles of artificial intelligence and its foundations and apply those basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.

UNIT I :

Introduction to Artificial Intelligence : Introduction, Brief History, Intelligent Systems, Categorization of Intelligent Systems, Components of AI Program, Foundations of AI, Sub-areas of AI, Applications, Development of AI Languages, Current Trends in AI, Future of AI

UNIT II :

Intelligent Agents: Rational Agents, Mapping from Sequences to Actions, Properties of Environments, Structure of Intelligent Agents, Types of Agents: Simple Reflex Agents, Goal Based Agents, Utility Based Agents.

UNIT III :

Prolog Programming language: Introduction, Prolog Program, Control Strategy of Prolog, Programming Techniques in Prolog, List Manipulation in Prolog, System Predicate, Cut, Effect of Rule and Goal Orders, Structuring of Data in Prolog, Recursive Data Types in Prolog, System-Defined Predicates.

UNIT IV :

Uninformed Search Strategies: Breadth-First Search, Uniform Cost Search, Depth-First Search, Analysis of Search Methods

UNIT V :

Informed Search Strategies: Heuristic Functions, Best-First Search, Greedy Search, A* Algorithm, Optimal Solution by A* Algorithm.

TEXT BOOKS:

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI, Pearson Education.
2. Artificial Intelligence – Structures and Strategies for Complex Problem Solving , George FLuger, Addison Wesley, Fifth Edition .
3. Prolog Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education.
4. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

Co-curricular Activities:

- AI News Board where students can stick upto date innovations happening in the field of AI.
- AiTube channel where students can publish their accomplishments in the field of AI.

Assessment Methods:

- Formal Examinations.
- Lab Practical Examination .
- Presentations.
- Simple Project .



B Sc	Semester: II	Credits: 01
Course: 2	AI USING PROLOG LAB	Hrs/Wk:02

Students should practice a minimum of 10 programs from the list using Prolog.

1. Program to add two numbers.
2. Program to categorize animal characteristics.
3. Program to read address of a person using compound variable.
4. Program to show concept of cut operator.
5. Program to count number of elements in a list .
6. Program to reverse the list.
7. Program to append an integer into the list.
8. Program to replace an integer from the list.
9. Program to delete an integer from the list.
10. Program to show concept of list.
11. Program to demonstrate family relationship.
12. Program to show how Prolog is used in medical diagnosis. .



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



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

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-1: వ్యక్తీకరణ వైపుణ్యాలు

1. భాష-ప్రాథమికాంశాలు: భాష-నిర్వచనం, లక్షణాలు, ఆవశ్యకత, 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/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.



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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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:

Indian Financial System- its components - Financial markets and institutions

(06hrs)

UNIT-II:

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

(10hrs)

UNIT-III:

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

(10hrs)

Co-curricular activities:

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.

(04 hrs)

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.



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

B.A/ B.Sc	Semester-III	Credits:4
Course:3	ABSTRACT ALGEBRA	Hrs/Week:5

Course Outcomes:

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

- acquire the basic knowledge and structure of groups, subgroups and cyclic groups.
- get the significance of the notation of a normal subgroups.
- get the behavior of permutations and operations on them.
- study the homomorphisms and isomorphisms with applications.
- Understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.
- Understand the applications of ring theory in various fields.

UNIT I: (12 Hours)

GROUPS : Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group, Composition tables with examples.

UNIT II: (12 Hours)

SUBGROUP:Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition- examples-criterion for a complex to be a subgroups. Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups. **Co-sets and Lagrange's Theorem:** Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

UNIT III: (12 Hours)

NORMAL SUBGROUPS: Definition of normal subgroup – proper and improper normal subgroup– Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group –quotient group – criteria for the existence of a quotient group.

UNIT IV: (12 Hours)

HOMOMORPHISM :Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

PERMUTATIONS: Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

UNIT V: (12 Hours)

RINGSDefinition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Group theory and its applications / Problem Solving.

TEXT BOOK :

1. A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, published by S.Chand & Company, New Delhi.

REFERENCE BOOKS :

1. Abstract Algebra by J.B. Fraleigh, Published by Narosa publishing house.
2. Modern Algebra by M.L. Khanna.
3. Rings and Linear Algebra by Pundir & Pundir, published by Pragathi Prakashan.



B Sc	Semester: III	Credits: 04
Course: 3	EXPERT SYSTEM	Hrs/Wk:04

LEARNING OBJECTIVES:

Students will be able to explain and describe the concepts central to the creation of knowledge bases and expert systems. Students will be knowledgeable about the tools and the processes used for the creation of an expert system. Student will know methods used to evaluate the performance of an expert system.

LEARNING OUTCOMES:

At the end students will be able to get an understanding of how to transform human knowledge into an expert system and design a knowledge base. A basic understanding of natural language processing and pattern recognition is acquired.

UNIT I :

Introduction: Introduction to Expert System, Definitions, Importance of Expert System, Characteristic features of Expert System, Applications of Expert System, Different Categories of Expert Systems.

UNIT-II

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT – III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems versus Traditional Systems, Rule Based Expert Systems, Blackboard Systems, Truth Maintenance Systems.

UNIT – IV

Introduction to Natural Language: Overview of Linguistics, Grammars and Languages, Basic Parsing Techniques, Semantic Analysis and Representation Structures, Natural Language Generation, Natural Language Systems

UNIT-V

Pattern Recognition: Introduction, The Recognition and Classification Process, Learning Classification Patterns, Recognizing and Understanding Speech.

TEXT BOOKS:

1. Expert System principles and Programming-Giarratano.Rilev.2003 .
2. Introduction to Expert Systems, V James P.Iginizo.Mc.Graw-Hill.inc .
3. Natural Language Processing: A Paninian Perspective, Akshar Bharti, Vineet Chaitanya and Rajeev sangal.

Co-curricular Activities:

- Quiz Competitions.
- Expert Lectures.
- Seminars

Assessment Methods:

- Formal Examinations.
- Lab Practical Examination .
- Presentations.
- Simple Project .



B Sc	Semester: III	Credits: 01
Course: 3	Expert System using LISP Lab	Hrs/Wk:02

List of programs using LISP. A minimum of 10 programs should be executed.

1. Write a "Hello World" program in LISP.
2. Write a LISP program to demonstrate the process of assigning the value in variable and showing them in console.
3. Write a LISP program to demonstrate the macros.
4. Write a LISP program to demonstrate the global and local variable and constant.
5. Write a LISP program to demonstrate the arithmetic expression.
6. Write a LISP program to demonstrate the comparison and logical operator.
7. Write a LISP program to demonstrate the decision making.
8. Write a LISP program to demonstrate the looping operations.
9. Write a LISP program to demonstrate the function.
10. Write a LISP program to calculate factorial by using function.
11. Write a LISP program to find maximum of three numbers.
12. Write a LISP program to find GCD of two numbers.
13. Write a lisp program to implement Fibonacci Series.
14. Write a program in LISP to demonstrate the concept of array.
15. Write a LISP program to demonstrate the string processing.



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:

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

REFERENCES:

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



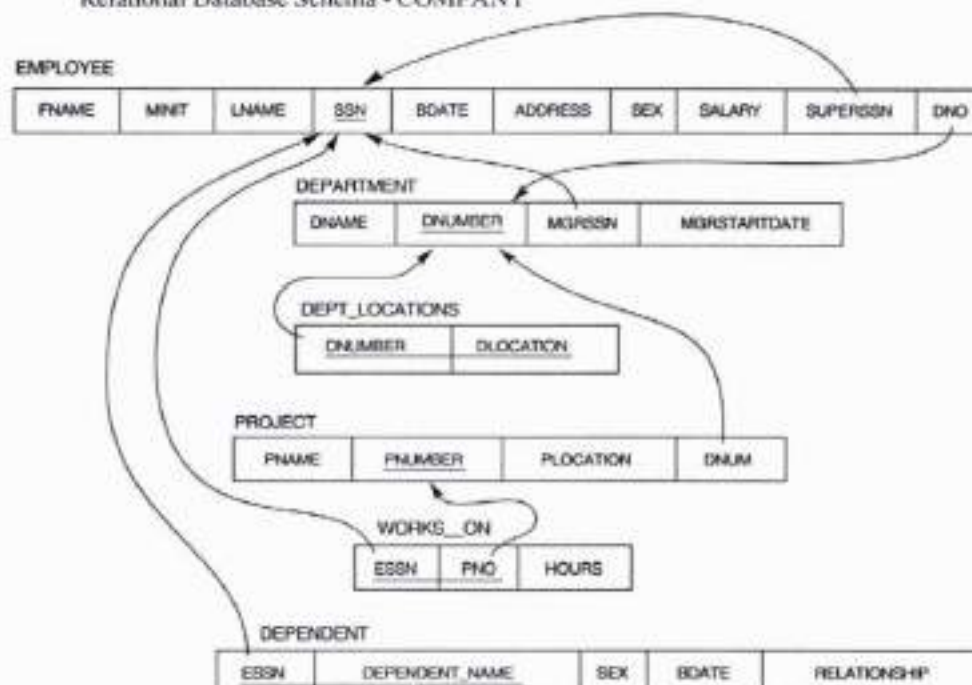
ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

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)



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

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.



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

B.A/ B.Sc	Semester-IV	Credits:4
Course:4	MATHEMATICS REAL ANALYSIS	Hrs/Week:5

Course Outcomes:

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

- get clear idea about the real numbers and real valued functions.
- obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
- Test the continuity and differentiability and Riemann integration of a function.
- Know the geometrical interpretation of mean value theorems.

UNIT I: (12 Hours)

Introduction of Real Numbers (No question is to be set from this portion)

Real Sequences: Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence. The Cauchy's criterion, properly divergent sequences, Monotone sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences, Cauchy Sequences – Cauchy's general principle of convergence theorem.

UNIT II: (12 Hours)

INFINITE SERIES :

Series : Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Cauchy's n^{th} root test or Root Test.
3. D'Alembert's Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

UNIT III: (12 Hours)

CONTINUITY:

Limits: Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. (No question is to be set from this portion).

Continuous functions: Continuous functions, Combinations of continuous functions, Continuous Functions on interval.

UNIT IV: (12 Hours)

DIFFERENTIATION AND MEAN VALUE THEOREMS: The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

UNIT V: (12 Hours)

RIEMANN INTEGRATION : Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, First mean value Theorem.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Real Analysis and its applications / Problem Solving.

TEXT BOOK:

1. Introduction to Real Analysis by Robert G.Bartle and Donald R. Sherbert, published by John Wiley.

REFERENCE BOOKS:

1. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
2. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisinghania, published by S. Chand & Company Pvt. Ltd., New Delhi.



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

B.A/ B.Sc	Semester-IV	Credits:4
Course:5	LINEAR ALGEBRA	Hrs/Week:5

Course Outcomes:

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

- understand the concepts of vector spaces, subspaces, bases, dimension and their properties.
- understand the concepts of linear transformations and their properties
- apply Cayley- Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods
- Learn the properties of inner product spaces and determine orthogonality in inner product spaces.

UNIT I: (12 Hours)

Vector Spaces-I: Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

UNIT II: (12 Hours)

Vector Spaces-II: Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotient space.

UNIT III: (12 Hours)

Linear Transformations: Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

UNIT IV: (12 Hours)

Matrix : Linear Equations, Characteristic equations, Characteristic Values & Vectors of square matrix, Cayley – Hamilton Theorem.

UNIT V: (12 Hours)

Inner product space : Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle Inequality, Parallelogram law, Orthogonality, Orthonormal set, Gram– Schmidt orthogonalisation process. Bessel's inequality and Parseval's Identity.

Co-Curricular Activities (15 Hours)

Seminar/ Quiz/ Assignments/ Linear algebra and its applications / Problem Solving.

TEXT BOOK:

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.

REFERENCE BOOKS:

2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et. al. published by Prentice Hall of India Pvt. Ltd. 4th Edition, 2007.



B Sc	Semester: IV	Credits: 04
Course: 4	FUNDAMENTALS OF IOT AND ROBOTICS	Hrs/Wk:04

COURSE OBJECTIVES:

The goal of the course is to familiarize the students with the fundamental concepts and techniques in robotic engineering and computer systems for their control and information processing.

LEARNING OUTCOMES:

Students will be exposed to fundamentals of IoT and a broad range of topics in robotics with emphasis on basics of manipulators, coordinate transformation and kinematics, trajectory planning and control techniques

UNIT I :

Introduction to IoT: Definition and Characteristics of IoT, IoT Enabling Technologies, IoT Levels and Deployment Templates. M2M and IoT, IoT Use cases: Home, Government, Cities, Environment, Energy Systems, Agriculture, Health and Lifestyle.

UNIT II:

Introduction to Robotics: Classification, Components, Characteristics, Applications. Robotics Kinematics, Position Analysis, Robots as Mechanisms, Matrix Representation, Transformation Matrices, Forward and Inverse Kinematics.

UNIT III :

Actuators: Characteristics of Actuating Systems, Actuating Devices and Control, Use of Reduction Gears, Comparison Of Hydraulic, Electric, Pneumatic Actuators, Hydraulic Actuators.

UNIT IV :

Sensors: Sensor Characteristics, Description of Different Sensors, Vision Sensors, Force Sensors, Proximity Sensors, Tilt Sensors.

UNIT V:

Robot Controls: Point to Point Control, Continuous Path Control, Intelligent Robot, Control System for Robot Joint, Control Actions, Feedback Devices.

TEXT BOOKS:

1. Saeed B. Niku, Introduction to Robotics Analysis, Application, Pearson Education Asia, 2001.
2. Vijay Madisetti and Arshdeep Bahga, Internet of Things - A Hands-on Approach, First Edition, University Press, 2015..

Co-curricular Activities:

- Take up IoT Projects of societal relevance.
- Adopt a school from rural area and educate children in simple IoT projects .

Assessment Methods:

- Formal Examinations.
- Lab Practical Examination.
- Presentations.
- Simple Project .



B Sc	Semester: IV	Credits: 01
Course: 4	IOT AND ROBOTICS LAB	Hrs/Wk:02

IoT LAB EXPERIMENTS. A minimum of 4 experiments should be done.

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation .
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds .
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. Students are encouraged to explore the surrounding problems and design Solutions based on IoT for any 3 of the following.
 - i. Health Monitoring System.
 - ii. Smart Irrigation System using Cloud.
 - iii. Smart Waste Management System.
 - iv. Smart Street Lights System.
 - v. Fire and Smoke Detection System.
 - vi. Gas Leakage Detection System.
 - vii. Water level Monitoring and Controlling System in Tanks.
 - viii. Air and Sound Pollution Monitoring System
 - ix. Intruder (Human/Animal) Detection in Agriculture Field.
 - x. Girl Child Safety System using GPS and GSM

Robotics Lab Experiments.

A minimum of 3 experiments should be done.

1. Programming a simple Robot on Wheels.
2. Programming a Walking Robot.
3. Experiments based on Bipedal Robot.
4. Experiments based on Humanoid Robot.
5. Spy Robot using RF Communication System.
6. Study of robotic arm and its configuration.
7. Study the robotic end effectors.
8. Study of sensor integration.
9. Setting robot for any one industrial application after industrial visit.



B Sc	Semester: IV	Credits: 04
Course: 5	MACHINE LEARNING	Hrs/Wk:04

COURSE OBJECTIVES:

To introduce students to the basic concepts and techniques of Machine Learning. To develop skills of using recent machine learning software for solving practical problems. To gain experience of doing independent study and research.

LEARNING OUTCOMES:

On completion of the course students will be expected to have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc. And also gain an understanding of the strengths and weaknesses of many popular machine learning approaches.

UNIT I :

Introduction: Well Posed Learning Problems, Choices in Designing a Learning System – Choosing the Training Experience, Choosing the Target Function, Choosing the Representation for Target Function, Choosing a Function Approximation Algorithm, The Final Design.

UNIT II :

Concept Learning: Introduction, Concept Learning Task- Notation, Concept Learning Search, FIND-S, The-List-Then Algorithm, Candidate Elimination Algorithm with an Illustrative Example, Inductive Bias.

UNIT III :

Decision Tree Learning: Decision Tree Representation, Appropriate Problems for Decision Tree Learning, Basic Decision tree Learning Algorithm with an Illustrative Example, Issues in Decision Tree Learning.

UNIT IV :

Neural Network Learning: Neural Network Representations, Problems for Neural Network Learning, Multi Layer Network and Back propagation Algorithm, Illustrative Example of Back Propagation Algorithm.

UNIT V :

Instance Based Learning: K Nearest Neighbour Learning Algorithm, Locally Weighted Regression, Case-Based Reasoning.

TEXT BOOKS:

1. Machine Learning, Tom Mitchell , McGraw Hill, 1997.
2. Practical Machine Learning with Python, Dipanjan Sarkar, Raghav Bali, Tushar Sharma, A Press, 2018.

Co-curricular Activities:

- Special Interest Group in Machine Learning .
- Machine Learning News Club.

Assessment Methods:

- Formal Examinations.
- Lab Practical Examination.
- Presentations.
- Simple Project.



B Sc	Semester: IV	Credits: 01
Course: 5	ML USING PYTHON LAB	Hrs/Wk:02

Implement a minimum of 2 programs using each of the following Python Libraries that are popularly used in Machine Learning.

1. Numpy for basic mathematical operations.
2. Scipy for image manipulation .
3. Scikit- learn for decision tree classifier.
4. Theano for computing logistic functions.
5. Keras to build neural networks.
6. Tensorflow for deep learning functions.
7. Pytorch for computer vision and NLP.
8. Pandas for data analysis.
9. Matplotlib for data visualisation.
10. Opencv for face recognition and identifying objects.



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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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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 works 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 from individual and collaborative work.



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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.



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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.A/ B.Sc	Semester-V(Skill Enhancement Course- Elective)	Credits:4
Course:6A	Numerical Methods	Hrs/Week:5

Learning Outcomes:

- Students after successful completion of the course will be able to
1. understand the subject of various numerical methods that are used to obtain approximate solutions
 2. Understand various finite difference concepts and interpolation methods.
 3. Workout numerical differentiation and integration whenever and wherever routine methods are not applicable.
 4. Find numerical solutions of ordinary differential equations by using various numerical methods.
 5. Analyze and evaluate the accuracy of numerical methods.

Syllabus:(Hours:Teaching:75(incl.unittestsetc.05),Training:15)

UNIT – I: Finite Differences and Interpolation with Equal intervals (15h)

1. Introduction, Forward differences, Backward differences, Central Differences, Symbolic relations, n th Differences of Some functions,
2. Advancing Difference formula, Differences of Factorial Polynomial, Summation of Series.
3. Newton's formulae for interpolation. Central Difference Interpolation Formulae

UNIT – II: Interpolation with Equal and Unequal intervals (15h)

1. Central Difference Interpolation Formulae.
Gauss's Forward interpolation formulae, Gauss's backward interpolation formulae, Stirling's formula, Bessel's formula.
2. Interpolation with unevenly spaced points, divided differences and properties, Newton's divided differences formula
3. Lagrange's interpolation formula, Lagrange's Inverse interpolation formula.

UNIT – III: Numerical Differentiation (15h)

1. Derivatives using Newton's forward difference formula, Newton's back ward difference formula,
2. Derivatives using central difference formula, Stirling's interpolation formula,
3. Newton's divided difference formula, Maximum and minimum values of a tabulated function.

UNIT – IV: Numerical Integration (15h)

1. General quadrature formula one errors, Trapezoidal rule,
2. Simpson's $1/3$ - rule, Simpson's $3/8$ – rule, and Weddle's rules,
3. Euler – McLaurin Formula of summation and quadrature, The Euler transformation.

UNIT – V: Numerical solution of ordinary differential equations (15h)

1. Introduction, Solution by Taylor's Series,
2. Picard's method of successive approximations,
3. Euler's method, Modified Euler's method, Runge – Kutta methods.

REFERENCES:

1. S.S.Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd., New

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2. P.Kandasamy, K.Thilagavathy, Calculus of Finite Differences and Numerical Analysis.
S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
3. R.Gupta, Numerical Analysis, Laxmi Publications (P) Ltd., New Delhi.
4. H.C Saxena, Finite Differences and Numerical Analysis, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
5. S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr.V.Ramesh Babu, Numerical Analysis, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
6. Web resources suggested by the teacher and college librarian including reading material.

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. Applications of Newton's forward and back ward difference formulae.
 2. Applications of Gauss forward and Gauss back ward, Stirling's and Bessel's formulae.
 3. Applications of Newton's divided differences formula and Lagrange's interpolation formula.
 4. Various methods to find the approximation of a definite integral.
 5. Different methods to find solutions of Ordinary Differential Equations.
2. For Student: Fieldwork/Project work; Each student individually shall undertake Fieldwork/Project work and submit a report not exceeding 10 pages in the given format on the workdone in the areas like the following, by choosing any one of the aspects.
 1. Collecting the data from the identified sources like Census department or Electricity department, by applying the Newton's, Gauss and Lagrange's interpolation formula, making observations and drawing conclusions. (Or)
 2. Selection of some region to find the area by applying Trapezoidal rule, Simpson's 1/3- rule, Simpson's 3/8 - rule, and Weddle's rules. Comparing the solutions with analytical solution and concluding which one is the best method. (Or).
 3. Findingsolutionof the ODE by Taylor's Series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge-Kutta methods. Comparing the solutions with analytical solution, selecting the best method.
3. Max. Marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

B.A/ B.Sc	Semester-V(Skill Enhancement Course- Elective)	Credits:4
Course:7A	Mathematical Special Functions	Hrs/Week:5

Learning Outcomes:

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

1. Understand the Beta and Gamma functions, their properties and relation between these two functions,

- understand the orthogonal properties of Chebyshev polynomials and recurrence relations.
2. Find power series solutions of ordinary differential equations.
 3. solve Hermite equation and write the Hermite Polynomial of order (degree) n , also find the generating function for Hermite Polynomials, study the orthogonal properties of Hermite Polynomials and recurrence relations.
 4. Solve Legendre equation and write the Legendre equation of first kind, also find the generating function for Legendre Polynomials, understand the orthogonal properties of Legendre Polynomials.
 5. Solve Bessel equation and write the Bessel equation of first kind of order n , also find the generating function for Bessel function understand the orthogonal properties of Bessel function.

II. Syllabus: (Hours: Teaching: 75 (incl. unit tests etc. 05), Training: 15)

UNIT I: Beta and Gamma functions, Chebyshev polynomials (15h)

1. Euler's Integrals-Beta and Gamma Functions, Elementary properties of Gamma Functions, Transformation of Gamma Functions.
2. Another form of Beta Function, Relation between Beta and Gamma Functions.
3. Chebyshev polynomials, orthogonal properties of Chebyshev polynomials, recurrence relations, generating functions for Chebyshev polynomials.

UNIT II: Power series and Power series solutions of ordinary differential equations (15h)

1. Introduction, summary of useful results, power series, radius of convergence, theorems on Power series
2. Introduction of power series solutions of ordinary differential equation
3. Ordinary and singular points, regular and irregular singular points, power series solution.

UNIT III: Hermite polynomials (15h)

1. Hermite Differential Equations, Solution of Hermite Equation, Hermite polynomials, generating function for Hermite polynomials.
2. Other forms for Hermite Polynomials, Rodrigues formula for Hermite Polynomials, to find first few Hermite Polynomials.
3. Orthogonal properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

UNIT IV: Legendre polynomials (15h)

1. Definition, Solution of Legendre's equation, Legendre polynomial of degree n , generating function of Legendre polynomials.
2. Definition of $P_n(x)$ and $Q_n(x)$, General solution of Legendre's Equation (derivations not required) to show that $P_n(x)$ is the coefficient of h^n , in the expansion of $(1 - 2xh + h^2)^{-\frac{1}{2}}$
3. Orthogonal properties of Legendre's polynomials, Recurrence formulas for Legendre's Polynomials.

UNIT V: Bessel's equation (15h)

1. Definition, Solution of Bessel's equation, Bessel's function of the first kind of order n , Bessel's function of the second kind of order n .
2. Integration of Bessel's equation in series form-0, Definition of $J_n(x)$ recurrence formulae for $J_n(x)$, orthogonality of Bessel functions

REFERENCE BOOKS:

1. Dr.M.D.Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
2. J.N.Sharma and Dr.R.K.Gupta, Differential equations with special functions, Krishna Prakashan Mandir.
3. Shanti Narayan and Dr.P.K.Mittal, Integral Calculus, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
4. George F.Simmons, Differential Equations with Applications and Historical Notes, Tata McGRAW-Hill Edition, 1994.
5. Shepley L.Ross, Differential equations, Second Edition, John Willy & sons, New York, 1974.
6. Web resources suggested by the teacher and college librarian including reading material.

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).
 2. Beta and Gamma functions, Chebyshev polynomials.
 3. Power series, power series solutions of ordinary differential equations, Procedures of finding series solutions of Hermite equation, Legendre equation and Bessel equation.
 4. Procedures of finding generating functions for Hermite polynomials, Legendre Polynomials and Bessel's function.
2. For Student: Fieldwork/Project work; Each student individually shall undertake Fieldwork/Project work, make observations and conclusions 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. Going through the web sources like Open Educational Resources on the properties of Beta and Gamma functions, Chebyshev polynomials, power series solutions of ordinary differential equations. (or)
 2. Going through the web sources like Open Educational Resources on the properties of series solutions of Hermite equation, Legendre equation and Bessel equation.
 3. Max. Marks for Fieldwork/Project work Report: 05.
 4. Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
 5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

B.A/ B.Sc	Semester-V(Skill Enhancement Course- Elective)	Credits:4
Course:6B	Multiple integrals and applications of Vector calculus	Hrs/Week:5

Learning Outcomes:

Students after successful completion of the course will be able to

1. Learn multiple integrals as a natural extension of definite integral to a function of two variables in the case of double integral / three variables in the case of triple integral.
2. Learn applications in terms of finding surface area by double integral and volume by triple integral.
3. Determine the gradient, divergence and curl of a vector and vector identities.
4. Evaluate line, surface and volume integrals.
5. understand relation between surface and volume integrals (Gauss divergence theorem), relation between line integral and volume integral (Green's theorem), relation between line and surface integral (Stokes theorem)

UNIT I: Multiple integrals-I (15h)

1. Introduction, Double integrals, Evaluation of double integrals, Properties of double integrals.
2. Region of integration, double integration in Polar Co-ordinates,
3. Change of variables in double integrals, change of order of integration.

UNIT II: Multiple integrals-II (15h)

1. Triple integral, region of integration, change of variables.
2. Plane areas by double integrals, surface area by double integral.
3. Volume as a double integral, volume as a triple integral.

UNIT III: Vector differentiation (15h)

1. Vector differentiation, ordinary derivatives of vectors,
2. Differentiability, Gradient, Divergence, Curl operators,
3. Formulae involving the separators.

UNIT IV: Vector integration (15h)

1. Line Integrals with examples.
2. Surface Integral with examples.
3. Volume integral with examples.

UNIT V: Vector integration applications (15h)

1. Gauss theorem and applications of Gauss theorem.
2. Green's theorem in plane and applications of Green's theorem.
3. Stokes's theorem and applications of Stokes theorem.

REFERENCE BOOKS:

1. Dr.M Anitha, Linear Algebra and Vector Calculus for Engineer, Spectrum University Press, SR Nagar, Hyderabad-500038, INDIA.
2. Dr.M.Babu Prasad, Dr.K.Krishna Rao, D.Srinivasulu, Y.AdiNarayana, Engineering Mathematics-II, Spectrum University Press, SR Nagar, Hyderabad-500038,INDIA.
3. V.Venkateswararao, N. Krishnamurthy, B.V.S.S.Sarma and S.Anjaneya Sastry, A text Book of B.Sc., Mathematics Volume-III, S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
4. R.Gupta, Vector Calculus, Laxmi Publications.
5. P.C.Matthews, Vector Calculus, Springer Verlag publications. 6. Web resources suggested by the teacher and college librarian including reading material.

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).
 2. The methods of evaluating double integrals and triple integrals in the class room and train to evaluate These integrals of different functions over different regions.
 3. Applications of line integral, surface integral and volume integral.
 4. Applications of Gauss divergence theorem, Green's theorem and Stokes's theorem.
2. For Student: Fieldwork/Project work Each student individually shall undertake Fieldwork/Project 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 following aspects.
1. Going through the web sources like Open Educational Resources to find the values of double and triple integrals of specific functions in a given region and make conclusions. (or)
 2. Going through the web sources like Open Educational Resources to evaluate line integral, surface integral and volume integral and apply Gauss divergence theorem, Green's theorem and Stokes theorem and make conclusions.
 3. ~~B.A/B.Sc~~ Marks for Fieldwork/Project work ~~to be reported.~~

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4. Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
5. Unit tests (IE).

B) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified are

B.A/ B.Sc	Semester-V(Skill Enhancement Course- Elective)	Credits:4
Course:7B	Integral transforms with applications	Hrs/Weak:5

Learning Outcomes:

Students after successful completion of the course will be able to

1. Evaluate Laplace transforms of certain functions, find Laplace transforms of derivatives and of integrals.
2. Determine properties of Laplace transform which may be solved by application of special functions namely Dirac delta function, error function, Bessel function and periodic function.
3. Understand properties of inverse Laplace transforms, find inverse Laplace transforms of derivatives and of integrals.
4. Solve ordinary differential equations with constant/ variable coefficients by using Laplace transform method.
5. Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms.

Syllabus :(Hours: Teaching: 75 (incl. unit tests etc.05), Training: 15)

UNIT I: Laplace transforms- I

(15h)

1. Definition of Laplace transform, linearity property-piecewise continuous function.
2. Existence of Laplace transform, functions of exponential order and of class A.
3. First shifting theorem, second shifting theorem and change of scale property

- UNIT II: Laplace transforms- II** (15h)
1. Laplace Transform of the derivatives, initial value theorem and final value theorem, Laplace transforms of integrals.
 2. Laplace transform of $\ln f(t)$, division by t , evolution of integrals by Laplace transforms.
 3. Laplace transform of some special functions-namely Dirac delta function, error function, Bessel function and Laplace transform of periodic function.
- UNIT III: Inverse Laplace transforms** (15h)
1. Definition of Inverse Laplace transform, linear property, first shifting theorem, second shifting theorem, change of scale property, use of partial fractions.
 2. Inverse Laplace transforms of derivatives, inverse, Laplace transforms of integrals, multiplication by powers of 'p', division by 'p'.
 3. Convolution, convolution theorem proof and applications.
- UNIT IV: Applications of Laplace transforms** (15h)
1. Solutions of differential equations with constants coefficients, solutions of differential equations with variable coefficients.
 2. Applications of Laplace transforms to integral equations- Abel's integral equation.
 3. Converting the differential equations into integral equations, converting the integral equations into differential equations.
- UNIT V: Fourier transforms** (15h)
1. Integral transforms, Fourier integral theorem (without proof), Fourier sine and cosine integrals.
 2. Properties of Fourier transforms, change of scale property, shifting property, modulation theorem. Convolution.
 3. Convolution theorem for Fourier transform, Parseval's Identify, finite Fourier transforms.

REFERENCE BOOKS:

1. Dr. S.Sreenadh, S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr. V.Ramesh Babu, Fourier series and Integral Transforms, S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
2. A.R. Vasistha, Dr. R.K. Gupta, Laplace Transforms, Krishna Prakashan Media Pvt. Ltd. Meerut.
3. M.D.Raisinghania, H.C. Saxena , H.K. Dass, Integral Transforms, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
4. Dr. J.K. Goyal, K.P. Gupta, Laplace and Fourier Transforms, Pragathi Prakashan, Meerut.
5. Shanthi Narayana , P.K. Mittal, A Course of Mathematical Analysis, S. Chand & Company Pvt.Ltd. Ram Nagar, New Delhi-110055.
6. Web resources suggested by the teacher and college librarian including reading material.

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).
2. Demonstrate on sufficient conditions for the existence of the Laplace transform of a function.
3. Evaluation of Laplace transforms and methods of finding Laplace transforms.
4. Evaluations of Inverse Laplace transforms and methods of finding Inverse Laplace transforms.
5. Fourier transforms and solutions of integral equations.

2. **For Student:** Fieldwork/Project work; Each student individually shall undertake Fieldwork/Project 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.

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1. Going through the web sources like Open Educational Resources on Applications of Laplace transforms and Inverse Laplace transforms to find solutions of ordinary differential equations with constant /variable coefficients and make conclusions. (or)
2. Going through the web sources like Open Educational Resources on Applications of convolution theorem to solve integral equations and make conclusions. (or)
3. Going through the web source like Open Educational Resources on Applications of Fourier transforms to solve integral equations and make conclusions.
4. Max. Marks for Fieldwork/Project work Report: 05.
5. Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
6. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

B.A/ B.Sc	Semester-V(Skill Enhancement Course- Elective)	Credits:4
Course:6C	Partial differential equations & Fourier series	Hrs/Week:5

Learning Outcomes:

Students after successful completion of the course will be able to

1. Classify partial differential equations, formation of partial differential equations and solve Cauchy's problem for first order equations.
2. Solve Lagrange's equations by various methods, find integral Surface passing through a given curve and Surfaces orthogonal to a given system of Surfaces.
3. Find solutions of nonlinear partial differential equations of order one by using Char pit's method.
4. Find solutions of nonlinear partial differential equations of order one by using Jacobi's method.
5. Understand Fourier series expansion of a function $f(x)$ and Parseval's theorem.

Syllabus: (Hours: Teaching: 75 (incl. unit tests etc.05), Training: 15)

UNIT I: Introduction of partial differential equations

(15h)

1. Partial Differential Equations, classification of first order partial differential equations, Rule I, derivation of a partial differential equations by the elimination of arbitrary constants
2. Rule II, derivation of a partial differential equation by the elimination of arbitrary function ϕ from the equations $\phi(u, v) = 0$ where u and v are functions of x, y and z .
3. Cauchy's problem for first order equations.

UNIT II: Linear partial differential equations of order one

(15h)

1. Lagrange's equations, Lagrange's method of solving $Pp+Qq=R$, where P, Q, R are functions of x, y and z ,

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type 1 based on Rule I for solving $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$, type 2 based on Rule II for solving $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

2. Type 3 based on Rule III for solving $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$, type 4 based on Rule IV for solving $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$
3. Integral Surface passing through a given curve, the Cauchy problem, Surfaces orthogonal to a given system of Surfaces.

UNIT III: Non-linear partial differential equations of order one-I (15h)

1. Complete integral, particular integral, singular integral and general integral, geometrical interpretation of integrals of $f(x, y, z, p, q) = 0$, method of getting singular integral from the PDE of first order, compatible system of first order equations.
2. Charpit's method, Standard form I, only p and q present.
3. Standard form II, Clairaut equations.

UNIT IV: Non-linear partial differential equations of order one-II (15h)

1. Standard Form III, only p, q and z present.
2. Standard Form IV, equation of the form $f(x, p) = f_2(y, q)$.
3. Jacobi's method, Jacobi's method for solving partial differential equations with three or more independent variables, Jacobi's method for solving a non-linear first order partial differential equations in two independent variables.

UNIT V: Fourier series (15h)

1. Introduction, Euler's formulae for Fourier series expansion of a function $f(x)$, Dirichlet's conditions for Fourier series, convergence of Fourier series.
2. Functions having arbitrary periods. Change of interval, Half range series.
3. Parseval's theorem, illustrative examples based on Parseval's theorem, some particular series.

REFERENCE BOOKS:

1. Dr.M.D.Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
2. Dr. S.Sreenadh, S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr. V.Ramesh Babu, Fourier Series and Integral Transforms, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
3. Prof T.Amaranath, An Elementary Course in Partial Differential Equations Second Edition, Narosa Publishing House, New Delhi.
4. Fritz John, Partial Differential Equations, Narosa Publishing House, New Delhi, 1979.
5. I.N.Sneddon, Elements of Partial Differential Equations by McGraw Hill, International Edition, Mathematics series.
6. Web resources suggested by the teacher and college librarian including reading material.

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).
2. On classification of first order partial differential equations, formation of partial differential equations.
3. Various methods of finding solutions of partial differential equations.
4. Integral Surface passing through a given curve and Surfaces orthogonal to a give system of Surfaces.

b) For Student: Fieldwork/Project work; Each student individually shall undertake Fieldwork/Project 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. Going through the web source like Open Educational Resources to find solutions of partial differential equations by using Lagrange's method, Charpit's method and Jacobi's method and make conclusions. (or)
2. Going through the web source like Open Educational Resources to find Integral Surface passing through a

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- given curve and Surfaces orthogonal to a given system of Surfaces and make conclusions. (or)
- Going through the web source like Open Educational Resources to find Fourier series expansions of some functions and applications of Parseval's theorem and make conclusions.
 - Max. Marks for Fieldwork/Project work Report: 05.
 - Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
 - Unit tests (IE).

b) Suggested Co-Curricular Activities

- Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
- Visits to research organizations, Statistical Cells, Universities, ISI etc.
- Invited lectures and presentations on related topics by experts in the specified area.

B.A/ B.Sc	Semester-V(Skill Enhancement Course- Elective)	Credits:4
Course:7C	Number theory	Hrs/Week:5

Learning Outcomes:

Students after successful completion of the course will be able to

- Find quotients and remainders from integer division, study divisibility properties of integers and the distribution of primes.
- Understand Dirichlet multiplication which helps to clarify interrelationship between various arithmetical functions.
- Comprehend the behaviour of some arithmetical functions for large n .
- Understand the concepts of congruencies, residue classes and complete residues systems.
- Comprehend the concept of quadratic residues mod p and quadratic non residues mod p .

Syllabus: (Hours: Teaching:75 (incl. unit tests etc.05), Training:15)

UNIT I: Divisibility (15h)

- Introduction, Divisibility, Greatest Common Divisor.
- Prime numbers, The fundamental theorem of arithmetic, The series of reciprocals of the primes.
- The Euclidean algorithm, The greatest common divisor of more than two numbers.

UNIT II: Arithmetical Functions and Dirichlet Multiplication (15h)

- Introduction, The Mobius function $\mu(n)$, The Euler totient function $\phi(n)$, A relation connecting ϕ and μ , A product formula for $\phi(n)$.
- The Dirichlet product of arithmetical functions, Dirichlet inverses and Mobius inversion formula, The Mangoldt function $\Lambda(n)$.
- Multiplicative functions, Multiplicative functions and Dirichlet multiplication, The inverse of a completely multiplicative function, Liouville's function $\lambda(n)$, The divisor functions $\sigma\alpha(n)$.

UNIT III: Averages of Arithmetical Functions (15h)

- Introduction, The big oh notation. Asymptotic equality of functions, Euler's summation formula, some elementary asymptotic formulas.

2. The average order of $d(n)$, The average order of the divisor functions $\sigma_\alpha(n)$, The average order of $\varphi(n)$. 3. The average order of $\mu(n)$ and $\Lambda(n)$, The partial sum of a Dirichlet product, Applications of $\mu(n)$ and $\Lambda(n)$

UNIT IV: Congruences (15h)

1. Definition and basic properties of congruences, Residue classes and complete residue systems.
2. Linear congruences, reduced residue systems and the Euler-Fermat theorem. Polynomial congruences modulo p . Lagrange's theorem.
3. Applications of Lagrange's theorem, Simultaneous linear congruences. The Chinese remainder theorem. Applications of the Chinese remainder theorem.

UNIT V: Quadratic Residues and the Quadratic Reciprocity Law (15h)

1. Quadratic Residues, Legendre's symbol and its properties, Evaluation of $(-1/p)$ and $(2/p)$, Gauss lemma,
2. The Quadratic reciprocity law, Applications of the reciprocity law, The Jacobi Symbol.
3. Gauss sums and the quadratic reciprocity law, the reciprocity law for quadratic Gauss sums. Another proof of the quadratic reciprocity law.

REFERENCE BOOKS:

1. Tom M. Apostol, Introduction to Analytic Number theory, Springer International Student Edition.
2. David, M. Burton, Elementary Number Theory, 2nd Edition UBS Publishers.
3. Hardy & Wright, Number Theory, Oxford Univ. Press.
4. Dence, J. B & Dence T.P, Elements of the Theory of Numbers, Academic Press.
5. Niven, Zuckerman & Montgomery, Introduction to the Theory of Numbers.
6. Web resources suggested by the teacher and college librarian including reading material.

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. Finding quotient and numbers from integer division and the method of solving congruences. Further problems related to the theory of quadratic residues.
2. Applications of Lagrange's theorem.
3. Applications of the Chinese remainder theorem.
4. Applications of the reciprocity law.

2. For Student: Fieldwork/Project work; Each student individually shall undertake Fieldwork/Project 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. Going through the web sources like Open Educational Resources and list out Applications of Lagrange's theorem, and make conclusions.(or)
2. Going through the web sources like Open Educational Resources and list out Applications of the Chinese remainder theorem and make conclusions.(or)
3. Going through the web sources like Open Educational Resource and list out Applications of the reciprocity law and make conclusions. Max. Marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.



B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:6A	Artificial Neural Network	Hrs/Wk:4

Goal: This course will disseminate the student with the most fundamental knowledge for understanding AI and some basic search algorithms for problem solving; knowledge representation and reasoning; pattern recognition; fuzzy logic; and neural networks.

Course Objective: By the end of this course, a student will.

- To introduce the student's fundamentals concepts of Neural network and its various
- Application in computer science. To perform cognitive functions as problem solving and machine learning.

Teaching Learning Methodology:

Lectures, Class discussions, Demonstrations using various tools, Practical and Simulation Student Presentation, Problem solving or case studies. Use of flip chart board by instructor as aid in teaching.

UNIT I: Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications.

UNIT II: Unsupervised learning: - Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner Take-All learning rule.

UNIT III: Feed forward neural network, feed backward neural network, Perception and its learning law, single layer perception, multi-layer perception.

UNIT IV: Self-organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.

UNIT V: Associative memory, auto-associative memory, bi-directional associative memory

TEXT BOOKS:

1. Hill, T., Marquez, L., O'Connor, M., & Remus, W. (1994). Artificial neural network models for forecasting and decision making. *International journal of forecasting*, 10(1), 5-15.
2. Suzuki, K. (Ed.). (2013). *Artificial neural networks: architectures and applications*. BoD-Books on Demand. Ermentrout, G. B., Beverlin, B., Troyer, T., & Netoff, T. I. (2011). The variance of phaseresetting curves. *Journal of computational neuroscience*, 31(2), 185-197.



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

LIST OF EXPERIMENTS:

1. Study and Practice on various commands like man, passwd, tty, script, clear, date, cal, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who.
2. Study and Practice on various commands like cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.
3. a) Write a Shell Program to print all .txt files and .c files.
b) Write a Shell program to move a set of files to a specified directory.
c) Write a Shell program to display all the users who are currently logged in after a specified time.
d) Write a Shell Program to wish the user based on the login time.
4. a) Simulate cat command.
b) Simulate cp command.
5. a) Simulate head command.
b) Simulate tail command.
6. a) Simulate mv command.
b) Simulate nl command.
7. Write a program to handle the signals like SIGINT, SIGQUIT, SIGFPE.
8. Implement the following IPC forms
a) FIFO
b) PIPE.
9. Implement message queue form of IPC.
10. Implement shared memory form of IPC.
11. Write a Socket program to print system date and time (Using TCP/IP).



B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:7A	Neural Network and Fuzzy Logic	Hrs/Wk:4

Course Objective:

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

UNIT-I:

Basic neural computation models: Network and node properties. Inference and learning algorithms. Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.

UNIT-II:

Self organizing networks: Kohonen algorithm, bi-directional associative memories. Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.

UNIT-III:

Fuzzy Sets: Operations and properties.
Fuzzy Relations: Cardinality, Operations and properties.
Value Assignments: Cosine amplitude and max-min method.
Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy partition.

UNIT-IV:

Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning.
Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.

UNIT-V:

Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.

TEXT BOOKS & REFERENCES:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill 1997.
4. Bart Kosho "Neural Network and Fuzzy Systems", Prentice Hall of India, 1994.



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

DICTIONARY:

- Write a program to count the numbers of characters in the string and store them in a dictionary data structure.
- Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

NESTED LISTS:

- Write a program to read a 3 X 3 matrix and find the transpose.
- Write a program to perform addition, subtraction of two 3 X 3 matrices.

USER DEFINED FUNCTIONS:

- Write a function ball collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius If (distance between two balls centers) \leq (sum of their radii) then (they are colliding).

- Write a function to find mean, median, mode for the given set of numbers in a list.

MODULES:

- Install packages requests, flask and explore using (pip).
- Write a Python program that imports requests and fetch content from wiki page.

DATE AND TIME:

- Demonstrate Basic date and time classes, Different time formats, Converting between formats, Formatting dates and times, Parsing date/time information.
- Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.

CLASS AND OBJECTS:

- Create a class ATM and define ATM operations to create account, deposit, check balance, withdraw and delete account. Use constructor to initialize members.
- Make a class Employee with a name and salary. Make a class Manager inherit from Employee. Add an instance variable, named department. Write a method that prints manager's name, department and salary. Make a class Executive inherit from Manager. Write a method that prints the string "Executive" followed by the information stored in the Manager super class object.



B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:6B	Cryptography and Network Security	Hrs/Wk:4

Course Objective:

The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

Course Contents:

UNIT –I:

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security.

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

UNIT – II:

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Crypt analysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution.

Asymmetric key Ciphers: Principles of public key crypt to systems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.

UNIT – III:

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

UNIT – IV:

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, key management.

UNIT – V:

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.

Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls.

TEXT BOOKS:

1. Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition
2. Cryptography and Network Security : Atul Kahate, McGraw Hill Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India, 1st
2. Cryptography and Network Security : Forouzan Mukhopadhyay, MC Graw Hill, 2nd Edition.



B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:1
Course:6B	Cryptography and Network Security Lab	Hrs/Wk:2

LIST OF EXPERIMENTS:

- Lab 1: Implementation of Caesar Cipher technique
- Lab 2: Implement the Play fair Cipher
- Lab 3: Implement the Pure Transposition Cipher
- Lab 4: Implement DES Encryption and Decryption
- Lab 5: Implement the AES Encryption and decryption
- Lab 6: Implement RSA Encryption Algorithm
- Lab 7: Implementation of Hash Functions



B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:7B	Cyber Security	Hrs/Wk:4

Objectives:

- The Cyber security course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

Outcomes:

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios

UNIT-I: Introduction to Cybercrime:

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals?, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT-II: Cyber offenses:

How Criminals Plan them – Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The fuel for Cybercrime, Attack Vector Cloud computing.

UNIT-III: Cybercrime mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones.

Mobile Devices : Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile computing Era, Laptops.

UNIT-IV: Tools and Methods used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Stegnography, DoS and DDoSAttacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (IDTheft)

UNIT-V: Cybercrimes and Cyber security:

Why do we need cyber laws: The Indian context, the Indian IT Act, challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Blueprint, Security education, Training and awareness program, Continuing Strategies.



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B.Sc - Artificial Intelligence & Robotics Syllabus (w.e.f: 2020-21 A.Y)

TEXT BOOKS:

1. Cyber Security: understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, sunitBelapure, Wiley
2. Principles of information security, Micheal E. Whitman and Herbert J. Mattord, Cengage Learning.
3. Information Security, Mark Rhodes, Ousley, MGH



B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:1
Course:7B	Cyber Security Lab	Hrs/Wk:2

LIST OF EXPERIMENTS:

1. Study of steps to protect your personal computer system by creating User Accounts with Passwords and types of User Accounts for safety and security.
2. Study the steps to protect a Microsoft Word Document of different version with different operating system.
3. Study the steps to remove Passwords from Microsoft Word.
4. Study various methods of protecting and securing databases.
5. Study “How to make strong passwords” and “passwords cracking techniques”.
6. Study the steps to hack a strong password.



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

Learning Objectives: In this course students will learn R. Programming language, data analytics, data visualisation and statistical model for data analytics. By completion of this course, students will be able to become data analyst.

UNIT I: Introduction to Data Analysis: Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.

UNIT II: R Programming Basics : Overview of R programming, Environment setup with R Studio, R Commands, Variables and Data Types, Control Structures, Array, Matrix, Vectors, Factors, Functions, R packages.

UNIT III: Data Visualization using R: Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatter plots, Pie Charts.

UNIT IV: Statistics with R : Random Forest, Decision Tree, Normal and Binomial distributions, Time Series Analysis, Linear and Multiple Regression, Logistic Regression, Survival Analysis.

UNIT V: Prescriptive Analytics: Creating data for analytics through designed experiments, Creating data for analytics through active learning, Creating data for analytics through reinforcement learning.

TEXT BOOKS:

1. An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16). URL: <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>

REFERENCE BOOKS:

1. Jared P Lander, R for everyone: advanced analytics and graphics, Pearson Education, 2013
2. Dunlop, Dorothy D., and Ajit C. Tamhane. Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000.
3. G Casella and R.L. Berger, Statistical Inference, Thomson Learning 2002
4. P. Dalgaard. Introductory Statistics with R, 2nd Edition. (Springer 2008)
5. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer



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

LIST OF PROGRAMS:

1. Download and install R-Programming environment and install basic packages using install. Packages () command in R.
2. Learn all the basics of R-Programming (Data types, Variables, Operators etc.)
3. Implement R-Loops with different examples.
4. Learn the basics of functions in R and implement with examples.
5. Implement data frames in R. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.

6. Implement different String Manipulation functions in R.
7. Implement different data structures in R (Vectors, Lists, Data Frames)
8. Write a program to read a csv file and analyze the data in the file in R
9. Create pie charts and bar charts using R.
10. Create a data set and do statistical analysis on the data using R



B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course:7C	Data Ware Housing and Mining	Hrs/Wk:4

Objectives:

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

Outcomes:

- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques.
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules
- Analyze Classification and Clustering algorithms.

UNIT-I:

Introduction: Why Data Mining? What is Data mining? What kinds of data can be mined? – What kinds of patterns can be mind? Which Technologies are used? Which kinds of Applications are targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.

UNIT-II:

Data Pre-processing: Data Preprocessing : An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT-III:

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT-IV:

Classification: Alternative Techniques, Bayes Theorem, Naive Bayesian Classification, Bayesian Belief Networks.

UNIT-V:

Association Analysis: Basic Concepts and Algorithms : Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets.

TEXT BOOKS:

1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.



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B.Sc - Artificial Intelligence & Robotics Syllabus (w.e.f: 2020-21 A.Y)

B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:1
Course:7C	Data Ware Housing and Mining Lab	Hrs/Wk:2

SQL LAB:

A. Consider the following schema for a LibraryDatabase:

- BOOK (Book_id, Title, Publisher_Name, Pub_Year)
- BOOK_AUTHORS (Book_id, Author_Name)
- PUBLISHER (Name, Address, Phone) BOOK_COPIES
(Book_id, Branch_id, No-of_Copies)
- BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date)
- LIBRARY_BRANCH (Branch_id, Branch_Name, Address)

Write SQL queries to:

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan2017 to Jun2017
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

B. Consider the following schema for OrderDatabase:

- SALESMAN (Salesman_id, Name, City, Commission)
- CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id)
- ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)

Write SQL queries to:

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesmen who had more than one customer.
3. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted

WEKA LAB:

1. Create data-set in arff file format. Demonstration of preprocessing on WEKA data-set.
2. Demonstration of Association rule process on data-set contact lenses.arff /supermarket using apriori algorithm.
3. Demonstration of classification rule process on WEKA data-set using j48 algorithm.
4. Demonstration of classification rule process on WEKA data-set using naive bayes algorithm.
5. Demonstration of clustering rule process on data-set iris.arff using simple k-means.



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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: 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/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:



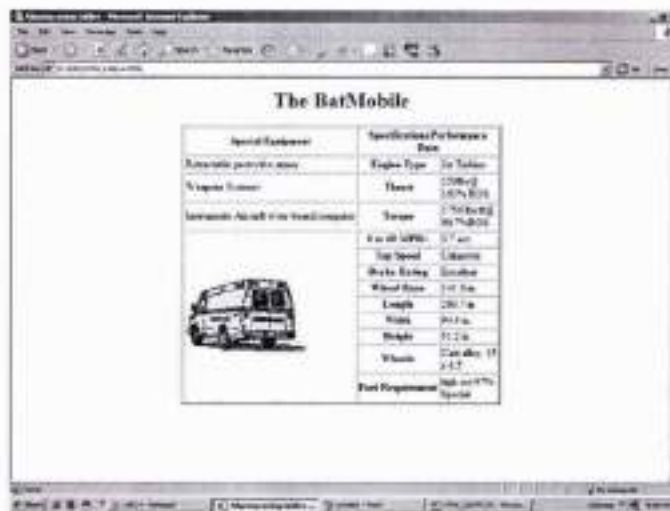
5. Create a menu form using html.
6. Style the menu buttons using css.
7. Create a form using HTML which has the following types of controls:



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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.



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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	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 contentdevelopment
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.



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: 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.



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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: 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



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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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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 ($s=(v^2-u^2)/2*a$)

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 therecords.



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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: 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



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 (1E).

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.



B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 6C	Data science Lab	Hrs/Wk: 2

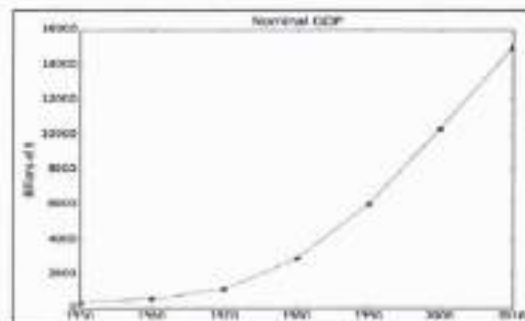
Course 6C: Data Science – PRACTICAL SYLLABUS

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

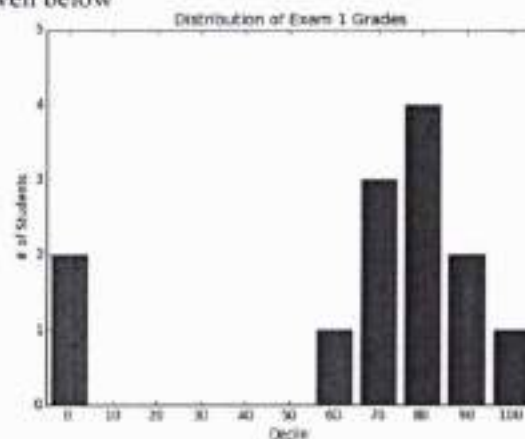
1. Apply data science solutions to real world problems.
2. Implement the programs to get the required data, process it and present the outputs using Python language.
3. Execute statistical analyses with Open source Python software.

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.



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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: 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/~keen/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.



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



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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