

ACHARYA NAGARJUNA UNIVERSITY

CENTRE FOR DISTANCE EDUCATION

NAGARJUNA NAGAR,

GUNTUR

ANDHRA PRADESH



PROGRAM PROJECT

REPORT

**63. BACHELOR OF SCIENCE (MATHEMATICS,
STATISTICS, COMPUTER SCIENCE)**

Bachelor of Science - (Maths, Statistics, Computer Science)

PROGRAMME CODE: 63

MISSION :

To achieve a high level of excellence in the standards of education and to bring the same within the reach of rural poor.

To make meaningful innovations in the process of teaching and learning through active involvement of teachers and the taught.

To impart training in acquiring skills needed for employment/self employment at the undergraduate level.

OBJECTIVES :

This program allows students to combine studies in the unique and innovative Bachelor of Science program with a wide range of majors in the Science. The Bachelor of Science teaches students how to develop strategies to help find solutions to a range of Scientific issues at the local, national and international level.

RELEVANCE :

The Bachelor of Sciences Maths, Statistics, Computer Science programme offered through Open and Distance Learning mode is purely relevant and aligned with the goals and mission of CDE, ANU. This programme is designed to enhance the core potential of the learner in relating historic perspective with the contemporary socio linguistic scenario, which is globally ever dynamic. The student will learn contemporary applications in the relevant subjects and become eligible to handle every kind of institutional demands which is conforming to the University vision and mission.

NATURE OF PERSPECTIVE TARGET GROUP OF LEARNERS :

Aim of open and distance education is to enhance the academic competence in those who were deprived of higher education for various socio-economic reasons. This programme is designed for candidates to provide quality education at affordable cost to larger sections of population by facilitating the reach of education to the doorsteps of people living in remote and far-flung areas. This program is useful for career advancement, improving skills, upgrading the qualification, add on course etc.

SKILLS AND COMPETENCE OF THE PROGRAMME :

Inconsideration of the huge gap in education and industry and also in skill development now it is imperative on the part of every university to reach out every nooc and corner of the country where the institutions with significant infrastructure are not available in order to elevate the status of the marginalised sections of the society especially living in rural areas of the country. The only solution appears to be "open and distance education" and Acharya Nagarjuna University takes initiative by reaching out those unreached by ICT enabled blended mode of distance learning programmes. Bachelor of Sciences Maths, Statistics, Computer Science programme is an innovative programme.

The learning outcomes of this programme are as follows:

- Professional development of teachers.
- Incorporating generic transferrable skills and competencies
- To develop critical learning, analytical skills and research skills.

INSTRUCTIONAL DESIGN: Course structure and detailed syllabi

Acharya Nagarjuna University:: Centre for Distance Education
Nagarjuna Nagar, Guntur-522510

Bachelor of Science (Mathematics, Statistics, Computer Science)

Programme Code: 63

Programme Structure

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|----------------------|---|---------------------|----------------|-----------|---------|
| SEMESTER – I | | | | | |
| Part – I | | | | | |
| 101ENG21 | English – A Course in Communication and Soft Skills | 30 | 70 | 100 | 3 |
| 102TEL21 | Second Language – Telugu – Pracheena Telugu Kavithvam | 30 | 70 | 100 | 3 |
| 102HIN21 | Second Language – Hindi - Prose | | | | |
| 102SAN21 | Second Language – Sanskrit – Prose, Poetry & Grammar | | | | |
| 103LSA21 | Life Skill Course : Human Values and Professional Ethics | - | 50 | 50 | 2 |
| 104SDI24 | Skill Development Courses : Electrical Appliances | - | 50 | 50 | 2 |
| Part – II | | | | | |
| 101MAT24 | Mathematics-1: Differential Equations | 30 | 70 | 100 | 3 |
| 102MAT24 | Mathematics-1 Practical: Differential Equations | - | - | 50 | 2 |
| 101STT24 | Statistics-1: Descriptive Statistics | 30 | 70 | 100 | 3 |
| 102STT24 | Statistics-1 Practical: Descriptive Statistics | - | - | 50 | 2 |
| 101CSC24 | Computer Science-1: Problem Solving using C | 30 | 70 | 100 | 3 |
| 102CSC24 | Computer Science-1 Practical: Problem Solving using C - Lab | - | - | 50 | 2 |
| SEMESTER - II | | | | | |
| Part – I | | | | | |
| 201ENG21 | English – A Course in Reading & Writing Skills | 30 | 70 | 100 | 3 |
| 202TEL21 | Second Language – Telugu – Aadhunika Telugu Sahityam | 30 | 70 | 100 | 3 |
| 202HIN21 | Second Language – Hindi - Prose | | | | |
| 202SAN21 | Second Language – Sanskrit – Prose, Poetry & Grammar | | | | |
| 203LSB21 | Life Skill Course: Indian Culture and Science | - | 50 | 50 | 2 |
| 204SDJ24 | Skill Development - Paper – 1: Solar Energy | - | 50 | 50 | 2 |
| 205SDK24 | Skill Development - Paper – 2: Food Adulteration | - | 50 | 50 | 2 |
| Part – II | | | | | |

| | | | | | |
|-----------------------|---|----|----|-----|---|
| 201MAT24 | Mathematics-2: Group Theory | 30 | 70 | 100 | 3 |
| 202MAT24 | Mathematics-2 Practical: Group Theory | - | - | 50 | 2 |
| 201STT24 | Statistics-2: Statistical Methods | 30 | 70 | 100 | 3 |
| 202STT24 | Statistics-2 Practical: Statistical Methods | - | - | 50 | 2 |
| 201CSC24 | Computer Science-2: Practical: Digital Logic Design | 30 | 70 | 100 | 3 |
| 202CSC24 | Computer Science-2: Practical: Digital Logic Design- Lab | - | - | 50 | 2 |
| 201FPA21 | First Phase of Apprenticeship Between 1 st year and 2 nd year | - | - | 100 | 4 |
| SEMESTER - III | | | | | |
| Part – I | | | | | |
| 301ENG21 | English – A Course in Conversational Skills | 30 | 70 | 100 | 3 |
| 302TEL21 | Second Language – Telugu-Srujanathmaka Rachana | 30 | 70 | 100 | 3 |
| 302HIN21 | Second Language – Hindi - Poetry | | | | |
| 302SAN21 | Second Language – Sanskrit -Drama, Upanishad, Alankara and History of Literature | | | | |
| 303LSC21 | Life Skill Course : Personality Development and Leadership | - | 50 | 50 | 2 |
| 304LSD21 | Life Skill Course : Environmental Education | - | 50 | 50 | 2 |
| 305SDL24 | Skill Development : Environment Audit | - | 50 | 50 | 2 |
| Part – II | | | | | |
| 301MAT24 | Mathematics-3: Ring Theory | 30 | 70 | 100 | 3 |
| 302MAT24 | Mathematics-3 Practical: Ring Theory | - | - | 50 | 2 |
| 301STT24 | Statistics-3: Design and Analysis Of Experiments | 30 | 70 | 100 | 3 |
| 302STT24 | Statistics-3 Practical: Design and Analysis Of Experiments | - | - | 50 | 2 |
| 301CSC24 | Computer Science-3: Data Structures in C | 30 | 70 | 100 | 3 |
| 302CSC24 | Computer Science-3 Practical: Data Structures in C- Lab | - | - | 50 | 2 |
| SEMESTER - IV | | | | | |
| 401MAT24 | Mathematics-4: Introduction to Real Analysis | 30 | 70 | 100 | 3 |
| 402MAT24 | Mathematics-4 Practical: Introduction to Real Analysis | - | - | 50 | 2 |
| 403MAT24 | Mathematics-5: Linear Algebra | 30 | 70 | 100 | 3 |
| 404MAT24 | Mathematics-5 Practical: Linear Algebra | - | - | 50 | 2 |
| 401STT24 | Statistics-4: Numerical Analysis | 30 | 70 | 100 | 3 |

| | | | | | |
|----------------------------------|--|----|----|-----|------------|
| 402STT24 | Statistics-4 Practical: Numerical Analysis | - | - | 50 | 2 |
| 403STT24 | Statistics-5: Applied Statistics | 30 | 70 | 100 | 3 |
| 404STT24 | Statistics-5 Practical: Applied Statistics | - | - | 50 | 2 |
| 401CSC24 | Computer Science-4: Object Oriented Programming using Java | 30 | 70 | 100 | 3 |
| 402CSC24 | Computer Science-4 Practical: Object Oriented Programming using Java-Lab | - | - | 50 | 2 |
| 403CSC24 | Computer Science-5: Computer Organization | 30 | 70 | 100 | 3 |
| 404CSC24 | Computer Science-5 Practical: Computer Organization-Lab | - | - | 50 | 2 |
| 401SPA21 | Second Phase of Apprenticeship Between 2 nd year and 3 rd year | - | - | 100 | 4 |
| SEMESTER - V | | | | | |
| Skill Enhancement courses | | | | | |
| 501MAT24 | Mathematics-6: Vector Calculus | 30 | 70 | 100 | 3 |
| 502MAT24 | Mathematics-6 Practical: Vector Calculus | - | - | 50 | 2 |
| 503MAT24 | Mathematics-7: Functions of a Complex Variable | 30 | 70 | 100 | 3 |
| 504MAT24 | Mathematics-7 Practical: Functions of a Complex Variable | - | - | 50 | 2 |
| 501STT24 | Statistics-6: Computational Statistics and R Programming | 30 | 70 | 100 | 3 |
| 502STT24 | Statistics-6 Practical: Computational Statistics and R Programming | - | - | 50 | 2 |
| 503STT24 | Statistics-7: Statistical Quality Control | 30 | 70 | 100 | 3 |
| 504STT24 | Statistics-7 Practical: Statistical Quality Control | - | - | 50 | 2 |
| 501CSC24 | Computer Science-6: Database Management Systems | 30 | 70 | 100 | 3 |
| 502CSC24 | Computer Science-6 Practical: Database Management Systems-Lab | - | - | 50 | 2 |
| 503CSC24 | Computer Science-7: Operating Systems | 30 | 70 | 100 | 3 |
| 504CSC24 | Computer Science-7 Practical: Operating Systems-Lab | - | - | 50 | 2 |
| SEMESTER - VI | | | | | |
| 601TPW21 | Third Phase of Apprenticeship-Entire 6th Semester (Project work) | - | - | 100 | 6 |
| 601TPV21 | Third Phase of Apprenticeship-Entire 6th Semester (Viva-Voce) | - | - | 100 | 6 |
| | Total Credits | - | - | - | 159 |

English Syllabus-Semester-I

English Praxis Course-I

101ENG21- A Course in Communication and Soft Skills

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

I. UNIT: Listening Skills

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

II. UNIT: Speaking Skills

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

III. UNIT: 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

IV. UNIT: Writing

- i. Punctuation
- ii. Spelling
- iii. Paragraph Writing

V. UNIT: Soft Skills

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

బి.ఏ., బి.కాం., బి.యస్.సి., తదితర ప్రోగ్రాములు

అంశం: జనరల్ తెలుగు సెమిస్టర్-1

102TEL21 - కోర్సు-1 : ప్రాచీన తెలుగు కవిత్వం

యూనిట్ల సంఖ్య: 5

పీరియడ్ల సంఖ్య: 60

◆ అభ్యసన ఫలితాలు: -

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. ప్రాచీన తెలుగుసాహిత్యం యొక్క ప్రాచీనతను, విశిష్టతను గుర్తిస్తారు. తెలుగుసాహిత్యంలో ఆదికవినన్నయ కాలంనాటి భాషాసంస్కృతులను, ఇతిహాసకాలం నాటి రాజనీతి విషయాలపట్ల పరిజ్ఞానాన్ని సంపాదించగలరు.
2. శివకవుల కాలంనాటి మతపరిస్థితులను, భాషావిశేషాలను గ్రహిస్తారు. తెలుగు నుడికారం, సామెతలు, లోకోక్తులు మొదలైన భాషాంశాల పట్ల పరిజ్ఞానాన్ని పొందగలరు.
3. తిక్కన భారతంనాటి మత, ధార్మిక పరిస్థితులను, తిక్కన కవితాశిల్పాన్ని, నాటకీయతను అవగాహన చేసుకోగలరు.
4. ఎఱ్ఱన సూక్తివైచిత్రిని, ఇతిహాస కవిత్వంలోని విభిన్న రీతులపట్ల అభిరుచిని పొందగలరు. శ్రీనాథుని కాలం నాటి కవితావిశేషాలను, మొల్ల కవితా విశిష్టతను గుర్తించగలరు.
5. తెలుగు పద్యం స్వరూప-స్వభావాలను, సాహిత్యాభిరుచిని పెంపొందించుకుంటారు. ప్రాచీన కావ్యభాషలోని వ్యాకరణాంశాలను అధ్యయనం చేయడం ద్వారా భాషాసామర్థ్యాన్ని, రచనల మెళకువలను గ్రహించగలరు.

పాఠ్య ప్రణాళిక

యునిట్-I

రాజనీతి

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

యునిట్-II

దక్షయజ్ఞం

- నన్నెచోడుడు *వైస హాప ప్రశ్నలు మాత్రమే.*
కుమారసంభవం-ద్వితీయాశ్వాసం-(49-86 పద్యాలు)

యునిట్-III

ధామ్య ధర్మోపదేశము

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

యునిట్-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.

యునిట్-V

సీతారావణ సంవాదం

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

♦వ్యాకరణం

*2026, 2026
2026*

సంధులు: ఉత్పత్తిక, *గ సడవదీ* ద్రుతప్రకృతిక, ముగాగమ, *సవర్ణ, సుణ* ద్విరుక్తటకారాదేశ, యణాదేశ, వృద్ధి, శ్చుత్వ, *జశ్చ, అనునాసక సంధులు*

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

అలంకారాలు:

- అర్థాలంకారాలు : ఉపమ, ఉత్పేక్ష, రూపక, స్వభావోక్తి, అర్థాంతరవ్యాస, అతిశయోక్తి.
- శబ్దాలంకారాలు : అనుప్రాస (వృత్త్యనుప్రాస, ఛేకామప్రాస లాటానుప్రాస, అంత్యానుప్రాస)

ఛందస్సు

- వృత్తాలు: ఉత్పలమాల, చంపకమాల, శార్దూలము, మత్తేభము;
- జాతులు : కందం, ద్విపద; ఉపజాతులు : ఆటవెలది, తేటగీతి, సీసం మరియు ముత్యాలసరాలు

Note: I, II, IV యూనిట్ల నుండి మాత్రమే ప్రతి పాఠ్య అంశాన్నికీ, కష్ట పాఠ్యాలకు వృత్త పాఠ్యాల మాత్రమే ఇవ్వాలి.

[Signature]
CHANDAN
Telugu B.L.S.
17/2/2022

ఆధార గ్రంథాలు:

1. శ్రీమదాంధ్ర మహాభారతము : సభాపర్వము-తిరుమల తిరుపతి దేవస్థానం ప్రచురణ
2. శ్రీమదాంధ్ర మహాభారతము : విరాటపర్వము-తిరుమల తిరుపతి దేవస్థానం ప్రచురణ
3. కుమార సంభవం - నన్నెచోడుడు
4. పలనాటి వీరచరిత్ర - శ్రీనాథుడు
5. రామాయణము - మొల్ల

✦ సూచించబడిన సహపాఠ్య కార్యక్రమాలు:

1. నన్నయ్య, తిక్కన, ఎఱ్ఱన మొదలైన ప్రసిద్ధ కవుల పాఠ్యాంశేతర పద్యాలను ఇచ్చి, విద్యార్థులచేత సమీక్షలు రాయించడం; ఆయా పద్యాల్లోని యతిప్రాసాది ఛందోవిశేషాలను గుర్తింపజేయడం.
2. విద్యార్థులచేత పాఠ్యాంశాలకు సంబంధించిన వ్యాసాలు రాయించడం (సెమినార్/అసైన్మెంట్)
3. ప్రాచీన పాఠ్యాంశాలలోని సమకాలీనతను గూర్చిన బృంద చర్చ, ప్రాచీన సాహిత్యాన్ని నేటి సామాజిక దృష్టితో పునర్మూల్యాంకనం చేయించడం.
4. చారిత్రక, సాంస్కృతిక అంశాలకు సంబంధించిన పర్యాటక ప్రదేశాలను సందర్శించడం.
5. వ్యక్తిగత/బృంద ప్రాజెక్టులు చేయించడం. ప్రశ్నాపత్ర నిర్మాతలకు సూచనలు ప్రతిపదార్థ పద్యాలు, కంఠస్థ పద్యాలు “రాజనీతి, దక్షయజ్ఞం, ధౌమ్య ధర్మోపదేశం, సీతారావణ సంవాదం” అనే నాలుగు పాఠ్యాంశాల నుండి మాత్రమే ఇవ్వాలి.

ACHARYA NAGARJUNA UNIVERSITY

Hindi Syllabus from the Academic Year 2020-21

B.A., B.Com., BBA & B.Sc. FIRST YEAR SEMESTER - I

SECOND LANGUAGE - HINDI

102HIN21 - PROSE - 1) GADYA SANDESH - V.L. Narasimha Sinha

2) KATHALOK - Dr. Ghanshyam

Unit-I : गद्य संदेश (Prose)

1. साहित्य की महत्ता - महावीर प्रसाद द्विवेदी
2. मित्रता - आचार्य रामचंद्र शुक्ल
3. वही की वही बात - रमेश बख्शी

Unit-II : कथा लोक (Short Stories)

1. मुक्तिधन - मुन्शी प्रेमचंद
2. उसने कहा था - चन्द्रधर शर्मा गुलेरी
3. पुरस्कार - जयशंकर प्रसाद

Unit-III : अनुवाद (Translation)

कार्यालयीन शब्दावली (Official Terminology)

प्रशासनिक शब्दावली (Administrative Terminology)

(अंग्रेजी से हिन्दी में - English to Hindi)

Unit-IV : व्याकरण (Grammar)

1. लिंग, वचन, काल, वाच्य, कारक
2. विलोम शब्द
3. शब्दों का वाक्यों में प्रयोग

Unit - V : पत्र लेखन (Letter Writing): वैयक्तिक पत्र (Personal letters)

1. हिन्दी सीखने की आवश्यकता को बताते हुए छोटी बहन के नाम पर पत्र।
2. विहार यात्रा का वर्णन करते अपने मित्र के नाम पर पत्र।
3. शुल्क भरने के लिए पैसे भेजने अपने पिता के नाम पर पत्र।



Dr. G. VIJAYA RATNA KUMAR

CHIEF

Board of Studies, Hindi (U.G.)

Chitragupta Nagar, Nellore, Andhra Pradesh

CBCS SEMESTER WISE SYLLABUS

Part I (B) Subject : SANSKRIT

SEMESTER – I

102SAN21 - PAPER – I : POETRY, PROSE & GRAMMAR . (w.e.f. 2020-21)

- 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 phalamasnute",
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.

103LSA21 - HUMAN VALUES AND PROFESSIONAL ETHICS (HVPE)

(SYLLABUS)

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 (*SarvabhaumVyawastha*)- 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:

R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Bhatia, R. & Bhatia, A (2015) Role of Ethical Values in Indian Higher Education.

References:

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

Mode of Evaluation:

Assignment/ Seminar/Continuous Assessment Test/Semester End Exam.

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.

I YEAR – 1 SEMESTER-SYLLABUS

104SDI24: SKILL DEVELOPMENT COURSES: ELECTRICAL APPLIANCES

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

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

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

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.

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

English Syllabus-Semester-II

English Praxis Course-II

201ENG21 -A Course in Reading & Writing Skills

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

I. UNIT

| | |
|---------------|--|
| Prose | : 1. How to Avoid Foolish Opinions Bertrand Russell |
| Skills | : 2. Vocabulary: Conversion of Words : 3. One Word Substitutes : 4. Collocations |

II. UNIT

| | | |
|--------------------------|----------------------------|---------------------|
| 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 | |

III. UNIT

| | | |
|---------------|---|---------------------|
| Prose | : 1. The Night Train at Deoli | Ruskin Bond |
| Poetry | : 2. Upagupta | Rabindranath Tagore |
| Skills | : 3. Reading Comprehension : 4. Note Making/Taking | |

IV. UNIT

| | | |
|---------------|--|----------------|
| Poetry | : 1. Coromandel Fishers | Sarojini Naidu |
| Skills | : 2. Expansion of Ideas : 3. Notices, Agendas and Minutes | |

V.UNIT

| | | |
|--------------------------|---|-------------|
| Non-Detailed Text | : 1. An Astrologer's Day | R K Narayan |
| Skills | : 2. Curriculum Vitae and Resume : 3. Letters : 4. E-Correspondence | |

బి.ఏ., బి.కా., బి.యస్.సి., తదితర ప్రోగ్రాములు

అంశం: జనరల్ తెలుగు

సెమిస్టర్-2

202TEL21 - కోర్సు-2 : ఆధునిక తెలుగు సాహిత్యం

యూనిట్ల సంఖ్య: 5

పీరియడ్ల సంఖ్య: 60

✦ అభ్యసన ఫలితాలు:-

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. ఆంగ్లభాష ప్రభావం కారణంగా తెలుగులో వచ్చిన ఆధునిక సాహిత్యాన్ని, దాని విశిష్టతను గుర్తిస్తారు.
2. సమకాలీన ఆధునిక సాహిత్య ప్రక్రియలైన "వచన కవిత్వం, కథ, నవల, నాటకం, విమర్శ"లపై అవగాహన పొందుతారు.
3. భావకవిత, అభ్యుదయ కవితాలక్ష్యాలను గూర్చిన జ్ఞానాన్ని పొందుతారు. అస్తిత్వవాద ఉద్యమాలపుట్టుకను, ఆవశ్యకతను గుర్తిస్తారు.
4. కథాసాహిత్యం ద్వారా సామాజిక చైతన్యాన్ని పొందుతారు. సిద్ధాంతాల ద్వారా కాకుండా, వాస్తవ పరిస్థితులను తెలుసుకోవడం ద్వారా సిద్ధాంతాన్ని సమీక్షించగలరు.
5. ఆధునిక తెలుగు కల్పనాసాహిత్యం ద్వారా సామాజిక, సాంస్కృతిక, రాజకీయ చైతన్యాన్ని పొందుతారు.



CHAIRMAN
TELUGU B.E-S.

పాఠ్య ప్రణాళిక

యూనిట్-I : ఆధునిక కవిత్వం

1. ఆధునిక కవిత్వం- పరిచయం
2. కొండవీడు - దువ్వూరి రామిరెడ్డి
(‘కవికోకిల’ గ్రంథావళి-ఖండకావ్యాలు-సక్షత్రమాల సంపుటి నుండి)
3. మాత్యసంగీతం - 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



Chairman

T. B. S.

అధార గ్రంథాలు/వ్యాసాలు:

1. ఆధునిక కవిత్వం-పరిచయం : చూ. 'దృక్పథాలు' పుట 1-22, ఆచార్య ఎస్వీ. సత్యనారాయణ
2. తెలుగు కథానిక-పరిచయం : చూ. మన నవలలు-మన కథానికలు, పుట 118-130,
ఆచార్య రాచపాళెం చంద్రశేఖర రెడ్డి
3. తెలుగు నవల-పరిచయం : చూ. నవలాశిల్పం, పుట 1-17, వల్లంపాటి వెంకటసుబ్బయ్య
4. తెలుగు నాటకం-పరిచయం : చూ. తెలుగు నాటకరంగం, పుట 17-25 ఆచార్య ఎస్.గంగప్ప
5. తెలుగుసాహిత్య విమర్శ-పరిచయం: చూ.తెలుగుసాహిత్య విమర్శ-నాడు,నేడు పుట 213-217
తెలుగువాణి, అయిదవ అఖిలభారత తెలుగు మహాసభల ప్రత్యేక సంచిక
ఆచార్య జి.వి.సుబ్రహ్మణ్యం
6. నూరేళ్ళ తెలుగు నాటక రంగం - ఆచార్య మొదలి నాగభూషణశర్మ
7. నాటకశిల్పం - ఆచార్య మొదలి నాగభూషణశర్మ
8. సాంఘిక నవల-కథన శిల్పం - ఆచార్య సి.మృణాళిని.

✦ సూచించబడిన సహపాఠ్య కార్యక్రమాలు:

1. ఆధునిక కవిత్వానికి సంబంధించిన కొత్త కవితలను/అంశాలను ఇచ్చి, విద్యార్థులచేత
వాటిమీద అసైన్మెంట్లు రాయించడం
2. పాఠ్యాంశాలకు సంబంధించిన విషయాలపై వ్యాసాలు రాయించడం (సెమినార్/అసైన్మెంట్)
3. తెలుగు సాహిత్యంలోని ప్రసిద్ధ కథలపై, కవితలపై సమీక్షలు రాయించడం.
4. ఆధునిక పద్యనిర్మాణ రచన చేయించడం.
5. విద్యార్థులను బృందాలుగా విభజించి, నాటకలపై/నవలలపై సమీక్షలు రాయించడం.
6. సాహిత్యవ్యాసాలు సేకరించడం, బృందచర్చ నిర్వహించడం, క్షేత్రపర్యటనలు.
7. ప్రసిద్ధుల విమర్శావ్యాసాలు చదివించి, వాటిని విద్యార్థుల సొంత మాటల్లో రాయించడం.
8. పాఠ్యాంశాలపై స్లీయ విమర్శావ్యాసాలు రాయించడం.

ACHARYA NAGARJUNA UNIVERSITY

Hindi Syllabus from the Academic Year 2020-21

B.A., B.Com., BBA & B.Sc. FIRST YEAR SEMESTER - II

SECOND LANGUAGE - HINDI

202HIN21 - PROSE - 1) GADYA SANDESH - V.L. Narasimha Sinha

2) KATHALOK - Dr. Ghanshyam

Unit-I : गद्य संदेश (Prose) :

1. भारत एक है - रामधारी सिंह 'दिनकर'
2. बेईमानी की परत - हरिशंकर परसाई
3. एच.आई.वी. / एड्स - डॉ. प्रकाश भातल बंडे

Unit-II : कथा लोक (Short Stories) :

1. भूख हड़ताल - श्री बालशौरी रेड्डी
2. परमात्मा का कुत्ता - मोहन राकेश
3. वापसी - उषा प्रियंवदा

Unit-III : अनुवाद (Translation)

कार्यालयीन हिन्दी (Functional Hindi)

प्रशासनिक शब्दावली (Administrative Terminology)


(हिन्दी से अंग्रेजी में) (Hindi to English)

Unit-IV : व्याकरण (Grammar)

1. वाक्यों को शुद्ध कीजिए
2. संधि विच्छेद
3. शब्दों का वाक्यों में प्रयोग

Unit - V : पत्र लेखन (Letter Writing) : शिकायती, आवेदन पत्र

1. नौकरी के लिए आवेदन पत्र।
2. नगर पालिका के अधिकारी के नाम शिकायती पत्र।
3. पुस्तक विक्रेता के नाम पर पत्र।


Dr. G. VIJAYA RATNA KULKARNI
CHAIRMAN
Board of Studies, Hindi & Urdu (U.G.)
Acharya Nagarjuna University
Nagarjuna Nagar-522 510.

CBCS SEMESTER WISE SYLLABUS

Part I (B) Subject : SANSKRIT

SEMESTER – II

202SAN21 - PAPER – II : POETRY, PROSE & GRAMMAR.

- 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.

A.P. State Council of Higher Education
B.A., B. Com & B. Sc Programmes

Revised CBCS w.e.f 2020-21

LIFE SKILL COURSE

203LSB21 - **Indian Culture & Science**

Total 30 hrs (02 h/wk, 02 Cr & Max 50 Marks)

Learning Outcomes:

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

1. Understand the evolution of India's culture
2. Analyze the process of modernization of Indian society and culture from past to future
3. Comprehend objective education and evaluate scientific development of India in various spheres
4. Inculcate nationalist and moral fervor and scientific temper

Syllabus:

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 GurrarnJashua (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: ((09 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: (03 hrs)

1. Assignments, Group discussions, Quiz etc
2. Invited Lecture by a local expert
3. 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 Acheivements
7. V. Ramakrishna, Social Reform Movement Andhra, Vikas Publications

I YEAR – 2 SEMESTER-SYLLABUS

204SDJ24: SKILL DEVELOPMENT – PAPER-1: SOLAR ENERGY

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:

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:

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:

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

Reference Books:

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

I YEAR – 2 SEMESTER-SYLLABUS

205SDK24: SKILL DEVELOPMENT-PAPER-2: FOOD ADULTERATION

Learning Outcomes:

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

1. Get basic knowledge on various foods and about adulteration.
2. Understand the adulteration of common foods and their adverse impact on health
3. Comprehend certain skills of detecting adulteration of common foods.
4. Be able to extend their knowledge to other kinds of adulteration, detection and remedies.
5. Know the basic laws and procedures regarding food adulteration and consumer protection.

UNIT-I – : Common Foods and Adulteration:

Common Foods subjected to Adulteration - Adulteration – Definition – Types; Poisonous substances, Foreign matter, Cheap substitutes, Spoiled parts. Adulteration through Food Additives – Intentional and incidental. General Impact on Human Health.

UNIT-II –: Adulteration of Common Foods and Methods of Detection:

Means of Adulteration Methods of Detection Adulterants in the following Foods; Milk, Oil, Grain, Sugar, Spices and condiments, Processed food, Fruits and vegetables. Additives and Sweetening agents (at least three methods of detection for each food item).

UNIT-III –: Present Laws and Procedures on Adulteration:

Highlights of Food Safety and Standards Act 2006 (FSSA) –Food Safety and Standards Authority of India–Rules and Procedures of Local Authorities.

Role of voluntary agencies such as, Agmark, I.S.I. Quality control laboratories of companies, Private testing laboratories, Quality control laboratories of consumer co-operatives.

Consumer education, Consumer's problems rights and responsibilities, COPRA 2019 - Offenses and Penalties – Procedures to Complain – Compensation to Victims.

Reference e Books and Websites:

1. A firstcourseinFoodAnalysis–A.Y.Sathe,NewAgeInternational(P)Ltd.,1999
2. Food Safety, case studies–Ramesh.V.Bhat,NIN,1992
3. https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/Beverages_and_confectionary.pdf
4. <https://cbseportal.com/project/Download-CBSE-XII-Chemistry-Project-Food-Adulteration#gsc.tab=0> (Downloadable e material on food adulteration)
5. <https://www.fssai.gov.in/>
6. <https://indianlegalsolution.com/laws-on-food-adulteration/>
7. <https://fssai.gov.in/dart/>
8. <https://byjus.com/biology/food-adulteration/>
9. Wikipedia
10. Vikaspedia

English Syllabus-Semester-III

English Praxis Course-III

301ENG21 -A Course in Conversational Skills

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

I. UNIT

Speech : 1. Tryst with Destiny Jawaharlal Nehru
Skills : 2. Greetings
: 3. Introductions

II. UNIT

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

III. UNIT

Interview : 1. Nelson Mandela's Interview With Larry King
Skills : 2. Asking and Giving Information
: 3. Agreeing and Disagreeing

IV. UNIT

Interview : 1. JRD Tata's Interview With T.N.Ninan
Skills : 2. Dialogue Building
: 3. Giving Instructions/Directions

V. UNIT

1. **Speech** : 1. You've Got to Find What You Love Steve Jobs
Skills : 2. Debates
: 3. Descriptions
: 4. Role Play

బి.ఏ., బి.కా., బి.యస్.సి., తదితర ప్రోగ్రాములు

అంశం: జనరల్ తెలుగు సెమిస్టర్-3

302TEL21 - కోర్సు-3 : సృజనాత్మక రచన

యూనిట్ల సంఖ్య:5

పీరియడ్ల సంఖ్య:60

✦ అభ్యసన ఫలితాలు:-

- ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.
1. తెలుగు సాహిత్య అభ్యసన ద్వారా నేర్చుకున్న నైపుణ్యాలను, సృజనాత్మక నైపుణ్యాలుగా మార్చుకోగలరు.
 2. విద్యార్థులు భాషాతత్వాన్ని, భాష యొక్క ఆవశ్యకతను, భాష యొక్క ప్రాధాన్యాన్ని గుర్తిస్తారు. మనిషి వ్యక్తిగత జీవనానికి, సామాజికవ్యవస్థ పటిష్టతకు భాష ప్రధానమని తెలుసుకుంటారు. తెలుగుభాషలోని కీలకాంశాలైన 'వర్ణం-పదం-వాక్యాల ప్రాధాన్యాన్ని గుర్తిస్తూ, వాగ్రూప- లిఖితరూప వ్యక్తీకరణ ద్వారా భాషానైపుణ్యాలను మెరుగుపరచుకోగలరు.
 3. భాషానైపుణ్యాలను అలవరచుకోవడంతోపాటు వినియోగించడం నేర్చుకుంటారు. రచనా, భాషానైపుణ్యాలను సృజనాత్మక రూపంలో వ్యక్తీకరించగలరు.
 4. ప్రాచీన పద్యరచనతో పాటు ఆధునిక కవిత, కథ, వ్యాసం, మొదలైన సాహిత్యప్రక్రియల నిర్మాణాలకు సంబంధించిన సిద్ధాంతవిషయాలను నేర్పడంతో పాటు వారిలో రచనా నైపుణ్యాలను పెంపొందించుకోగలరు.
 5. సృజన రంగం, ప్రసారమాధ్యమ రంగాల్లో ఉపాధి అవకాశాలను అందిస్తున్నట్లుగా అనిపిస్తున్నట్లుగా.
 6. అనువాద రంగంలో నైపుణ్యం సంపాదించగలరు.



CHAIRMAN
B.S.S. Telugu.

పాఠ్య ప్రణాళిక

యూనిట్-I: వ్యక్తికరణ నైపుణ్యాలు

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

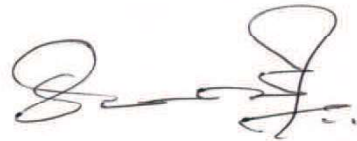
7. అనువాదం-నిర్వచనం, అనువాద పద్ధతులు,
8. అనువాద సమస్యలు-భౌగోళిక,భాషా,సాంస్కృతిక సమస్యలు, పరిష్కారాలు
9. అభ్యాసము : ఆంగ్లం నుండి తెలుగుకు,తెలుగు నుండి ఆంగ్లానికి ఒక పేరాను అనువదించడం

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



ఆధార గ్రంథాలు/వ్యాసాలు:

1. వ్యక్తికరణ నైపుణ్యాలు - చూ. 1. ఆధునిక భాషాశాస్త్ర సిద్ధాంతాలు-ఆచార్య పి.ఎస్.సుబ్రహ్మణ్యం
2. తెలుగు భాషా చరిత్ర - సం.ఆచార్య భద్రరాజు కృష్ణమూర్తి
3. తెలుగు వాక్యం - డా. చేకూరి రామారావు
2. ఉత్తమ కవిత-లక్షణాలు - చూ. నవ్యకవిత్వ లక్షణములు- ఆచార్య సి.నారాయణరెడ్డి
ఆధునికాంధ్ర కవిత్వము-సంప్రదాయములు, ప్రయోగములు: చతుర్థ ప్రకరణము.
3. ఉత్తమ కథ-లక్షణాలు - చూ.కథాశిల్పం-వల్లంపాటి వెంకటసుబ్బయ్య, పుటలు 11-17
4. ఉత్తమ వ్యాసం-లక్షణాలు- చూ.చదువు-సంస్కృతి (వ్యాసం) - కొడవటిగంటి కుటుంబరావు
5. అనువాద రచన - చూ.1. అనువాద సమస్యలు - రాచమల్లు రామచంద్రారెడ్డి
పుటలు 61-75, 85-94
2. అనువాదన పద్ధతులు ఆచరణ సమస్యలు-చేకూరి రామారావు
“భాషాంతరంగం”, పుటలు 130-146, తెలుగు విశ్వవిద్యాలయం ప్రచురణ
6. ముద్రణా మాధ్యమం - చూ. మాధ్యమాలకు రచన, పుటలు 9-12
- డా॥ బి.ఆర్.అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
7. పత్రికా భాష - చూ. మాధ్యమాలకు రచన, పుటలు 67-74
- డా॥ బి.ఆర్.అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
8. పత్రికా రచన - చూ. తెలుగు- మౌలికాంశాలు, పుటలు 59-69
- డా॥ బి.ఆర్.అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
9. ప్రసార మాధ్యమాలు - చూ. మాధ్యమాలకు రచన, పుటలు 3-10
- డా॥ బి.ఆర్.అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
10. రేడియో రచన - చూ.మాధ్యమాలకు రచన, పుటలు 141-148
- డా॥ బి.ఆర్.అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
11. వ్యాఖ్యానం (యాంకరింగ్) - చూ.మాధ్యమాలకు రచన, పుటలు 178-181
- డా॥ బి.ఆర్.అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
12. టెలివిజన్ రచన - చూ.మాధ్యమాలకు రచన, పుటలు 153-160
- డా॥ బి.ఆర్.అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
13. తెలుగు జర్నలిజం - డా॥ బూదరాజు రాధాకృష్ణ



సూచించబడిన సహపాఠ్య కార్యక్రమాలు

1. భాషాంశాలపై, వాక్య నిర్మాణంపై అసైన్మెంట్లు రాయించడం, పత్రికల్లోని సాహిత్య/భాషాంశాలను సేకరింపజేయడం.
2. విద్యార్థులచేత తెలుగుభాషా సాహిత్యాలపై ప్రసంగవ్యాసం ఇప్పించడం (సెమినార్/ అసైన్మెంట్)
3. వ్యాసరచన, లేఖారచన, స్వీయకవితలు రాయించి, తరగతిలో చదివింపజేయడం మొదలైనవి.
4. వివిధ కార్యక్రమాల్లో విద్యార్థులచేత సదస్సు నిర్వహణ, వ్యాఖ్యానం (యాంకరింగ్) చేయించడం.
5. సమకాలీన భాషాసమస్యలపై / ఉద్యమాలపై/సాంఘిక సమస్యలపై 'బృందచర్చ' (Group Discussion) నిర్వహింపజేయడం.
6. తెలుగుభాషా దినోత్సవం/అంతర్జాతీయ మాతృభాషా దినోత్సవం మొదలైన రోజుల్లో జరిగే సాంస్కృతిక కార్యక్రమాలు విద్యార్థులచేత నిర్వహింపజేయడం, వాటిపై సమీక్షలు/పత్రికా ప్రకటనలు రాయించడం.
7. సమకాలీన సంఘటనలపై సామాజిక మాధ్యమాల్లో/ టి.వి.ల్లో జరిగే చర్చలను నమోదు చేయించి సంకలనం చేయడం.
8. సాంస్కృతిక / చారిత్రక ప్రాశస్త్యం కలిగిన కట్టడాలు , దేవాలయాలు, కళానిలయాలను 'బృందపర్యటన/క్షేత్ర పర్యటన' ద్వారా విద్యార్థులచేత సందర్శింపజేయడం.

ACHARYA NAGARJUNA UNIVERSITY
Hindi Syllabus from the Academic Year 2021-22
B.A., B.Com., BBA & B.Sc. SECOND YEAR SEMESTER - III
SECOND LANGUAGE - HINDI
302HIN21 - POETRY - KAVYADEEP - B. Radha Krishna Murthy

Unit-I : काव्यदीप (Ancient & Modern Poetry) :

1. साखी - दोहे (1 से 10 तक) - कबीरदास
2. दोहे (1 से 10 तक) - रहीम
3. मातृभूमि - मैथिलीशरण गुप्त
4. तोड़ती पत्थर - सूर्यकांत त्रिपाठी 'निराला'
5. ओ दीपक! बुझने के पहले - प्रो. पी. आदेश्वर राव

Unit-II : हिन्दी साहित्य का इतिहास (History of Hindi Literature) :

भक्तिकाल - निर्गुण भक्ति धारा

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

Unit-III: साधारण निबन्ध (General Essays) :


1. समाचार पत्र
2. बेकारी की समस्या
3. कंप्यूटर
4. पर्यावरण और प्रदूषण
5. साहित्य और समाज

Unit-IV : अनुवाद (Translation) :

अनुवाद (अंग्रेजी से हिन्दी में) (Five Sentences)

Unit - V : प्रयोजनमूलक हिन्दी (Functional Hindi) :

1. परिपत्र (Circular)
2. ज्ञापन (Memorandum)


Dr. G. VIJAYA RATNA KUMARI
CHAIRMAN
Board of Studies, Hindi & Urdu (U.G.)
Acharya Nagarjuna University
Nagarjuna Nagar-522 510.

CBCS SEMESTER WISE SYLLABUS

Part I (B) Subject : SANSKRIT

SEMESTER – III

PAPER – III : Drama, Upanishad, Alankara and History of Literature. - 302SAN21

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 : ALANKARAS:

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

UNIT – V : HISTORY OF SANSKRIT LITERATURE

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

A.P. STATE COUNCIL OF HIGHER EDUCATION
B.A., B. Com & B. Sc Programmes

Revised CBCS w.e.f 2020-21

LIFE SKILL COURSE

303LSC21 - Personality Enhancement & Leadership

Total 30 hrs (02 h/wk, 02 Cr & Max 50 Marks)

Learning Outcomes:

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

1. Develop comprehensive understanding of personality
2. Know how to assess and enhance one's own personality
3. Comprehend leadership qualities and their importance
4. Understand how to develop leadership qualities

Syllabus:

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)

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

Reference Books:

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

AP State Council of Higher Education

Revised Syllabus under CBCS Pattern
(w.e.f. 2020-'21 Academic Year)

A Mandatory Course for BA/BCom/BSc etc.

304LSD21 -ENVIRONMENTAL EDUCATION

(Total hours of Teaching – 30 Hrs. @ 02 Hrs. per Week)

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

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

Unit 1: Environment and Natural Resources

06 Hrs.

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

10 Hrs

1. Concept of sustainability and sustainable development with judicious use of land, water and forest resources; afforestation.
2. Control measures for various types of pollution; use of renewable and alternate sources of energy.
3. Solid waste management: Control measures of urban and industrial waste.
4. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
5. Environment Laws: Environment Protection Act; Act; Wildlife Protection Act; Forest Conservation Act.
6. 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 :

- ErachBarucha (2004) *Text book of Environmental Studies for Undergraduate courses* (Prepared for University Grants Commission) Universities Press.
- PurnimaSmarath (2018) *Environmental studies* Kalyani Publishers, Ludhiana

Reference books :

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

I YEAR – 3 SEMESTER-SYLLABUS

305SDL24: SKILL DEVELOPMENT: ENVIRONMENT AUDIT

Learning Outcomes:

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

- *Understand the basic concepts Environmental health*
- *Learn and identify the industrial pollution*
- *Explain the highlights in the regulatory aspects of Environmental law and policy*
- *Understand the various phases of Environmental Audit*

UNIT – I

Industrial Pollution and its effects

Climate – Weather and Air Pollution – Classification of water and water bodies – Water Quality Parameters – Water Pollution – Sources – Classification, nature and Toxicology of water pollutants. - Soil parameters – Soil pollution and impacts – Soil conservation

UNIT - II

Environmental Law & Policy:

Highlights of the Acts, Institutional arrangements for: (1) The Water (Prevention & Control of Pollution) Act, 1974 amended in 1988; (2) The Air (Prevention and Control of Pollution) Act, 1981 amended in 1987; (3) The Water (Prevention and Control of Pollution) Cess Act, 1977 amended in 1991; (4) The Environment (Protection) Act, 1986; (5) The Public Liability Insurance Act, 1991; – Indian Policy Statement for abatement of Pollution, 1992.

UNIT - III

Environmental Audit - Scope & Requisites:

Environmental Audit: Definition; Objectives; Scope, Coverage - GOI Notification on Environmental Audit - Benefits to Industry. Reporting Environmental Audit Findings - Importance of Environmental Audit Report to industry, public and the governments.

Reference books and websites:

1. Environmental Education in India by K.R. Gupta
2. Environmental Legislation in India by K.R. Gupta
3. <https://parivesh.nic.in/>
4. <https://www.cpcb.nic.in/>
5. <https://www.free-ebooks.net/environmental-studies-academic>

B.SC- MATHEMATICS SYLLABUS

I YEAR- 1 SEMESTER

101MAT24: MATHEMATICS-1: DIFFERENTIAL EQUATIONS

Course Outcomes

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

- solve first order first degree linear differential equations.
- convert a non-exact homogeneous equation to exact differential equation by using an integrating factor.
- know the methods of finding solution of a differential equation of first order but not of first degree.
- solve higher-order linear differential equations for both homogeneous and non-homogeneous, with constant coefficients.
- understand and apply the appropriate methods for solving higher order differential equations.

Unit-1

Differential Equations of first order and first degree

Unit-1 Differential Equations of first order and first degree

Linear Differential Equations – Bernoulli's Equations - Exact Differential Equations – Integrating factors - Equations reducible to Exact Equations by Integrating Factors -

i) Inspection Method ii) $\frac{1}{Mx + Ny}$ iii) $\frac{1}{Mx - Ny}$

Unit-2

Differential Equations of first order but not of first degree

Equations solvable for p , Equations solvable for q , Equations solvable for x – Clairaut's equation - Orthogonal Trajectories: Cartesian and Polar forms.

Unit-3

Higher order linear differential equations

Solutions of homogeneous linear differential equations of order with constant coefficients - Solutions of non-homogeneous linear differential equations with constant coefficients by means of polynomial operators

(i) $Q(x) = e^{ax}$ (ii) $Q(x) = \sin ax$ (or) $\cos ax$

Unit – 4

Higher order linear differential equations (continued.)

Solution to a non-homogeneous linear differential equation 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

Unit-5

Higher order linear differential equations with non-constant coefficients

Linear differential Equations with non-constant coefficients; Cauchy-Euler Equation; Legendre Equation; Method of variation of parameters

Activities

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

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. Ordinary and Partial Differential Equations by Dr. M.D. Raisinghania, published by S. Chand &Company, New Delhi.
2. Differential Equations with applications and programs S. Balachandra Rao & HR Anuradha-Universities Press.
3. Differential Equations -Srinivas Vangala&Madhu Rajesh, published by Spectrum University Press.

**B.SC- MATHEMATICS SYLLABUS
I YEAR- 2 SEMESTER**

201MAT24: MATHEMATICS-2: GROUP THEORY

Course Outcomes

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

- acquire the basic knowledge and structure of groups
- get the significance of the notation of a subgroup and cosets.
- understand the concept of normal subgroups and properties of normal subgroup
- study the homomorphisms and isomorphisms with applications.
- understand the properties of permutation and cyclic groups

Unit – 1 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 – 2 Sub Groups

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition- examples-criterion for a complex to be a sub groups; Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups. Coset Definition – properties of Cosets – Index of a subgroups of a finite group – Lagrange’s Theorem.

Unit – 3 Normal Subgroups

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

Unit – 4 Homomorphisms

Quotient groups, 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.

Unit – 5 Permutations and Cyclic Groups

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

Cyclic Groups - Definition of cyclic group – elementary properties – classification of cyclic groups.

Activities

Seminar/ Quiz/ Assignments/ Applications of Group Theory to Real life Problem /Problem Solving Sessions.

Text Book

Modern Algebra by A.R.Vasishtha and A.K.Vasishtha, KrishnaPrakashanMedia Pvt. Ltd., Meerut.

Reference Books

1. Abstract Algebra by J.B. Fraleigh, Published by Narosa publishing house.
2. Modern Algebra by M.L. Khanna, Jai Prakash and Co. Printing Press, Meerut
3. Rings and Linear Algebra by Pundir&Pundir, published by PragathiPrakashan

B.SC- MATHEMATICS SYLLABUS
II YEAR- 3 SEMESTER
301MAT24: MATHEMATICS-3: RING THEORY

Course Outcomes

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

- acquire the basic knowledge of rings, fields and integral domains
- get the knowledge of subrings and ideals
- construct composition tables for finite quotient rings
- study the homomorphisms and isomorphisms with applications.
- get the idea of division algorithm of polynomials over a field.

Unit – 1 Rings and Fields

Definition of a ring and Examples – Basic properties – Boolean rings - Fields – Divisors of 0 and Cancellation Laws – Integral Domains – Division ring - The Characteristic of a Ring, Integral domain and Field – NonCommutative Rings - Matrices over a field – The Quaternion ring.

Unit – 2 Subrings and Ideals

Definition and examples of Subrings – Necessary and sufficient conditions for a subset to be a subring – Algebra of Subrings – Centre of a ring – left, right and two sided ideals – Algebra of ideals – Equivalence of a field and a commutative ring without proper ideals

Unit III: Principal ideals and Quotient rings

Definition of a Principal ideal ring(Domain) – Every field is a PID – The ring of integers is a PID – Example of a ring which is not a PIR – Cosets – Algebra of cosets – Quotient rings – Construction of composition tables for finite quotient rings of the ring Z of integers and the ring Z_n of integers modulo

n .

Unit – 4 Homomorphism of Rings

Homomorphism of Rings – Definition and Elementary properties – Kernel of a homomorphism – Isomorphism – Fundamental theorems of homomorphism of rings – Maximal and prime Ideals – Prime Fields

Unit – 5

Rings of Polynomials

Polynomials in an indeterminate – The Evaluation morphism -- The Division Algorithm in $F[x]$ – Irreducible Polynomials – Ideal Structure in $F[x]$ – Uniqueness of Factorization $F[x]$.

Activities

Seminar/ Quiz/ Assignments/ Applications of ring theory concepts to Real life Problem /Problem Solving Sessions.

Text book

Modern Algebra by A.R.Vasishta and A.K.Vasishta, Krishna Prakashan Media Pvt. Ltd.

Reference books

1. A First Course in Abstract Algebra by John. B. Farleigh, Narosa Publishing House.
2. Linear Algebra by Stephen. H. Friedberg and Others, Pearson Education India

B.SC- MATHEMATICS SYLLABUS
II YEAR- 4 SEMESTER
401MAT24: MATHEMATICS-4: INTRODUCTION TO REAL ANALYSIS

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 analysing 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.
- know about the fundamental theorem of integral calculus

Course Contents

Unit – 1 REAL NUMBERS, REAL SEQUENCES

The algebraic and order properties of \mathbb{R} - Absolute value and Real line - Completeness property of \mathbb{R} - Applications of supremum property - intervals. (**No question is to be set from this portion**) 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 and the Bolzano-Weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence.

Unit – 2 INFINITE 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 - P-test - Cauchy's n^{th} root test - D' - Alembert's Test - Alternating Series - Leibnitz Test.

Unit – 3 LIMIT & CONTINUITY

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 - Combinations of continuous functions - Continuous Functions on intervals - uniform continuity.

Unit – 4 DIFFERENTIATION AND MEAN VALUE THEOREMS

The derivability of a function at a point and on an interval - Derivability and continuity of a function - Mean Value Theorems - Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

Unit – 5 RIEMANN INTEGRATION

Riemann Integral - Riemann integral functions - Darboux theorem - Necessary and sufficient condition for \mathbb{R} integrability - Properties of integrable functions - Fundamental theorem of integral calculus - integral as the limit of a sum - Mean value Theorems.

Activities

Seminar/ Quiz/ Assignments/ Applications of Real Analysis to Real life Problem / Problem Solving Sessions.

Text Book

An Introduction to Real Analysis by Robert G. Bartle and Donald R. Sherbert, John Wiley and Sons Pvt. Ltd

Reference Books

1. Elements of Real Analysis by Shanthi Narayan and Dr. M. D. Raisinghania, S. Chand & Company Pvt. Ltd., New Delhi.
2. Principles of Mathematical Analysis by Walter Rudin, McGraw-Hill Ltd.

B.SC- MATHEMATICS SYLLABUS
II YEAR- 4 SEMESTER
403MAT24: MATHEMATICS-5: LINEAR ALGEBRA

Course Outcomes

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

- understand the concepts of vector spaces, subspaces
- understand the concepts of basis, dimension and their properties
- understand the concept of linear transformation and its 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 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 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 Linear Transformations

Linear transformations - linear operators- Properties of L.T- sum and product of L.Ts - Algebra of Linear Operators - Range and null space of linear transformation - Rank and Nullity of linear transformations - Rank- Nullity Theorem.

UNIT –IV Matrices

Characteristic equation - Characteristic Values - Characteristic vectors of a square matrix - Cayley Hamilton Theorem – problems on Cayley Hamilton Theorem.

UNIT –V 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- Problems on Gram– Schmidt orthogonalisation process - Bessel's inequality.

Activities :

Seminar/ Quiz/ Assignments/Applications of Linear Algebra in real life problems\ Problem Solving.

Text Books

1. Linear Algebra by J.N. Sharma and A.R. Vasishtha, published by Krishna Prakashan Media (P) Ltd.
2. Matrices by A.R.Vasishtha and A.K.Vasishtha published by Krishna Prakashan Media (P) Ltd.

Reference Books

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

B.SC- MATHEMATICS SYLLABUS
III YEAR- 5 SEMESTER
501MAT24: MATHEMATICS-6: VECTOR CALCULUS

Course outcomes:

Students after successful completion of the course will be able to

- 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.
- Learn applications in terms of finding surface area by double integral and volume by triple integral
- Determine the gradient, divergence and curl of a vector and vector identities.
- Evaluate line, surface and volume integrals.
- 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-1 Multiple Integrals-I

Introduction -Double integrals -Evaluation of double integrals –Properties of double integrals – Region of integration-double integration in Polar Co-ordinates– Change of variables in double integrals -change of order of integration.

Unit-2 Multiple integrals-II

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

Unit-3 Vector differentiation

Vector differentiation –ordinary – derivatives of vectors – Differentiability –Gradient – Divergence – Curl operators – Formula involving the separators.

Unit-4 Vector integration

Line Integrals with examples - Surface Integral with examples – Volume integral with examples.

Unit-5 Vector integration applications

Gauss theorem and applications of Gauss theorem-Green's theorem in plane and applications of Green's theorem - Stokes's theorem and applications of Stokes theorem.

Activities

Seminar/ Quiz/ Assignments/ Applications of Vector calculus to Real life Problems /Problem Solving Sessions.

Text Book

A text Book of Higher Engineering Mathematics by B.S.Grawal, Khanna Publishers, 43rd Edition

Reference Books

1. Vector Calculus by P.C.Matthews, Springer Verlag publications.
2. Vector Analysis by Murray Spiegel, Schaum Publishing Company, New York

B.SC- MATHEMATICS SYLLABUS
III YEAR- 5 SEMESTER
503MAT24: MATHEMATICS-7: FUNCTIONS OF A COMPLEX VARIABLE

Course Outcomes

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

- determine a Bilinear transformation under given condition
- know about continuity, compactness and connectedness of sets in complex plane
- know the necessary condition and sufficient condition for $f(z)$ to be analytic
- know about the inverse of an analytic function
- know about the convergence of sequences and the necessary & sufficient condition for a sequence to be convergent
- know the power series expansion of elementary functions

Unit – 1

Bilinear Transformation

Extended Complex Plane – Resultant and Inverse of a bilinear transformation – The linear group – Geometrical significance of the transformation. Angle preserving property of Bilinear Transformation– Determination of Bilinear transformations under given condition, some special bilinear transformations.

Unit – 2 Topological Considerations

Neighbourhood of a point – Interior, exterior and frontier points of a set, open and closed sets. Connected sets, Domains and continua - a theorem on Nests of closed Rectangular domains- Bolzano Weierstrass theorem- Hein-Borel theorem. Limits - algebraic operations with limits – continuity and uniform continuity – compactness – connectedness - Jordan curve theorem - connectedness of line segments and polygonal lines. Branch line and Branch point - Characterisation of open connected sets by polygonal lines.

Unit – 3 Analytic functions

Differentiable functions of a complex variable - Geometrical representation of a variable - Analytic function- Elementary rules and chain rule - Derivatives of polynomials and rational functions - The necessary condition and sufficient condition for $f(z)$ to be analytic - Analytic functions in a Domain – Derivative of w in polar form - Construction of $f(z)$.

Unit – 4

Inverse of an analytic function and infinite series

The inverse of an analytic function – neighbourhood preserving mappings - Domain preserving and angle preserving property of analytic mappings.

Convergent sequences, necessary and sufficient condition for a sequence to be convergent, Cauchy sequence, Convergence of infinite series. Cauchy general principle of convergence for a series. Absolute convergence of a series. Abel's and Dirichlet's tests. Rearrangement of series, product of series.

Unit -5

Power series

Power series - exponential, trigonometric and hyperbolic functions - zeros of $\sin z, \cos z$ - periods of $\sin z, \cos z, E(z)$ - A law of logarithms - Analytic character of $\log z$ - generalized a^b - Analytic character of $z^n - \cos^{-1} z, \sin^{-1} z$ and derivatives of $\cos^{-1} z, \sin^{-1} z$.

Text Book

Theory of Functions of a Complex variable by Shanti Narayan & Dr. P. K. Mittal, S. Chand & Company Ltd.

Reference Books

1. Theory of Functions of a Complex Variable by A. I. Markushevich, Second Edition, AMS Chelsea Publishing
2. Theory And Applications by M. S. Kasara, Complex Variables, 2nd Edition, Prentice Hall India Learning Private Limited

B.SC- STATISTICS SYLLABUS

I YEAR- 1 SEMESTER

101STT24: STATISTICS-1: DESCRIPTIVE STATISTICS

Learning Outcomes:

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

- To acquaint with the role of statistics in different fields with special reference to business and economics.
- To review good practice in presentation and the format most applicable to their own data.
- □□ To learn the measures of central tendency or averages reduce the data to a single value which is highly useful for making comparative studies.
- To familiar with the measures of dispersion throw light on reliability of average and control of variability.
- To deal with the situation where there is uncertainty and to measure that uncertainty by using the probability, which is essential in all research areas.

Unit – 1: Statistical Description of Data

Origin, history and definitions of Statistics. Importance, Scope and limitations Statistics. Function of Statistics – Collection, Presentation, Analysis and Interpretation. Collection of data - primary and secondary data and its methods. Classification of data – Quantitative, Qualitative, Temporal, Spatial. Presentation of data – Textual, Tabular – essential parts.

Unit – 2:

Measurement Scales – Nominal, Ordinal, Ratio and Interval. Frequency distribution and types of frequency distributions, forming a frequency distribution. Diagrammatic representation of data – Histogram, Bar, Multiple bar and Pie with simple problems. Graphical representation of data: Histogram, frequency polygon and Ogives with simple problems.

Unit – 3: Measures of Central Tendency (MCT)

Arithmetic Mean – properties, methods. Median, Mode, Geometric Mean (GM), Harmonic Mean (HM). Calculation of mean, median, mode, GM and HM for grouped and ungrouped data. Median and Mode through graph. Empirical relation between mean, median and mode. Features of good average.

Unit – 4: Measures of Dispersion

Concept and problems – Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non – Central moments and their interrelationship. Sheppard's correction for moments. Skewness and its methods, kurtosis.

Unit – 5: Elementary Probability

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

References

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand & Sons,

New Delhi.

2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
4. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

102STT24: STATISTICS -1 PRACTICAL: DESCRIPTIVE STATISTICS

Syllabus

1. Writing a Questionnaire in different situations.
2. Forming a grouped and ungrouped frequency distribution table.
3. Diagrammatic presentation of data – Bar, multiple Bar and Pie.
4. Graphical presentation of data – Histogram, frequency polygon, Ogives.
5. Computation of measures of central tendency – Mean, Median and Mode.
6. Computation of measures of dispersion – Q.D., M.D and S.D.
7. Computation of non-central, central moments, β_1 and β_2 for ungrouped data.
8. Computation of non-central, central moments, β_1 and β_2 and Sheppard's corrections for grouped data.
9. Computation of Karl Pearson's and Bowley's Coefficients of Skewness.

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

**B.SC- STATISTICS SYLLABUS
I YEAR- 2 SEMESTER**

201STT24: STATISTICS-2: STATISTICAL METHODS

Learning Outcomes

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

1. To get the knowledge of estimating future values by using curve fitting.
2. To calculate the relationship between bivariate data.
- To find the relationship about the multivariate data.
4. To acquaint about the forecasting of the data by using regression techniques.
5. To find the association of the categorical data by using attributes.

Unit – 1: Curve fitting

Bivariate data, Principle of least squares, fitting of k^{th} degree polynomial. Fitting of straight line, Fitting of Second degree polynomial or parabola, fitting of family of exponential curves and power curve.

Unit – 2: Correlation

Meaning, Types of Correlation, Measures of Correlation – Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient (with and without ties), Properties. Bivariate frequency distribution, correlation coefficient for bivariate data and problems. Lag and Lead in correlation.

Unit – 3:

Coefficient of concurrent deviation, probable error and its properties, coefficient of determination, Concept of multiple and partial correlation coefficients (three variables only), properties and problems, intra-class correlation and correlation ratio.

Unit – 4: Regression

Concept of Regression, Linear and Non Linear regression. Linear Regression – Regression lines, Regression coefficients and its properties, Angle between two lines of regression. Regressions lines for bivariate data and simple problems. Correlation vs regression. Explained and Unexplained variations.

Unit – 5: Attributes

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

References

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.

2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
4. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

202STT24: Statistics -2 Practical: STATISTICAL METHODS

Practical Syllabus

1. Fitting of straight line by the method of least squares
2. Fitting of parabola by the method of least squares
3. Fitting of exponential curve of two types by the method of least squares.
4. Fitting of power curve of the type by the method of least squares.
5. Computation of correlation coefficient and regression lines for ungrouped data.
6. Computation of correlation coefficient for bivariate frequency distribution.
7. Computation of correlation coefficient, forming regression lines for grouped data.
8. Computation of partial and multiple correlation coefficients.
9. Computation of Yule's coefficient of association and colligation.
10. Computation of Pearson's, Tschuprow's coefficient of contingency.

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

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

**B.SC- STATISTICS SYLLABUS
II YEAR- 3 SEMESTER**

301STT24: STATISTICS-3: DESIGN AND ANALYSIS OF EXPERIMENTS

Learning Outcomes

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

- To acquaint with the role of statistics in different fields with special reference to agriculture.
- Learn to apply the one of the design of experiment to agricultural fields.
- □□ Learn to apply the randomization to the blocks of various fields in agriculture.
- To get the familiarity about applications of three principles.
- Learn to deal the agricultural fields with different factors and levels.
- To use appropriate experimental designs to analyze the experimental data.

Unit – 1: Analysis of variance (ANOVA)

Concept, Definition and assumptions. ANOVA one way classification – mathematical model, analysis – with equal and unequal classification. ANOVA two way classification – mathematical model, analysis and problems.

Unit – 2: Completely Randomised Design (CRD)

Definition, terminology, Principles of design of experiments, CRD – Concept, advantages and disadvantages, applications, Layout, Statistical analysis. Critical Differences when hypothesis is significant.

Unit – 3: Randomised Block Design (RBD)

Concept, advantages and disadvantages, applications, Layout, Statistical analysis and Critical Differences. Efficiency of RBD relative to CRD. RBD with one missing value and its analysis, problems.

Unit – 4: Latin Square Design

Concept, advantages and disadvantages, applications, Layout, Statistical analysis and Critical Differences. Efficiency of LSD over RBD and CRD. Estimation of one missing value in LSD and its analysis, problems.

Unit – 5: Factorial experiments

Main effects and interaction effects of 2^2 and 2^3 factorial experiments and their Statistical analysis. Yates procedure to find factorial effect totals.

References

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Applied Statistics, Sultan Chand&Sons, New Delhi.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.
3. M. R. Saluja: Indian Official Statistics. ISI publications.

302STT24: STATISTICS -3 PRACTICAL: DESIGN AND ANALYSIS OF EXPERIMENTS

Practical Syllabus

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

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

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

**B.SC- STATISTICS SYLLABUS
II YEAR- 4 SEMESTER**

401STT24: STATISTICS-4: NUMERICAL ANALYSIS

Learning Outcomes

After learning this course the student will be able

- Learn the different difference operators and applications.
- Accustom with the interpolation techniques with equal and unequal intervals.
- Able to use numerical differentiation tools.
- Familiar to use numerical integration methods.

Unit 1

Definitions of Forward difference operator (Δ), Backward difference operator, Shift or Extension (displacement) operator (E), Central Differences operator(μ), Differentiation operator(D), Mean value operator Symbolic relations between operators, properties of difference and shift operators, fundamental theorem on finite differences and simple problems.

Unit 2

Interpolation with equal intervals: Concept of interpolation and extrapolation, assumptions and uses of interpolation, difference tables, methods of interpolation with equal intervals - Newton's formula for forward and backward interpolation, Central differences, Gauss forward and backward, Sterling, Bessel's and Laplace - Everett's Formulae.

Unit 3

Interpolation with unequal intervals: Divided differences and their properties. Methods of interpolation with unequal intervals – Newton's Divided difference formula and Lagrange's formula. Inverse interpolation - Lagrange's formula.

Unit 4

Numerical Differentiation: Introduction to Numerical differentiation. Determination of First and Second order derivatives for the given data using Newton's forward and backward, Gauss forward and backward, Sterling, Bessel's and Newton's Divided difference formula.

Unit 5

Numerical Integration: Introduction to numerical integration, General Quadrature formula for equidistant ordinates, Trapezoidal rule, Simpson's $1/3^{\text{rd}}$, Simpson's $3/8^{\text{th}}$ rule and Weddle's rule.

References

1. H. C. Saxena: Finite Differences and Numerical Analysis, S. Chand and Company, New Delhi.
2. P. P. Gupta, G. S. Malik & Sanjay Gupta: Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Media(P) Ltd., Meerut(UP), India.

3. S. S. Sastry: Introductory Methods Numerical Analysis, Prentice- Hall of India.
4. C. F. Gerald and P. O. Wheatley: Applied Numerical Analysis, Addison- Wesley, 1998.

402STT24: STATISTICS -4 PRACTICAL: NUMERICAL ANALYSIS

Practical Syllabus

1. Interpolation by using Newton-Gregory forward and backward difference formulae.
2. Interpolation by using Gauss forward and backward difference formulae.
3. Interpolation by using Sterling and Bessel's formulae.
4. Interpolation by using Laplace-Everett's Formula.
5. Interpolation by using Newton's divided difference and Lagrange's formulae.
6. Inverse interpolation by using Lagrange's formula.
7. Determination of first and second order derivatives by using Newton-Gregory forward and backward difference formulae.
8. Determination of first and second order derivatives by using Gauss forward and backward difference formulae.
9. Determination of first and second order derivatives by using Newton's divided difference formula.
10. Numerical Integration by using Trapezoidal rule, Simpson's $1/3^{\text{rd}}$, Simpson's $3/8^{\text{th}}$ rule and Weddle's rule.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

**B.SC- STATISTICS SYLLABUS
II YEAR- 4 SEMESTER**

403STT24: STATISTICS-5: APPLIED STATISTICS

Learning Outcomes

After learning this course, the student will be able to know about

- Forecasting Techniques and its applications.
- Interpret and use a range of index numbers commonly used in the business sector.
- Perform calculations involving simple and weighted index numbers.
- Understand the basic structure of the Consumer price index and perform calculations involving its use.
- Various data collection methods enabling to have a better insight in policy making, planning and systematic implementation,
- Construction and implementation of life tables.
- Population growth curves, population estimates and projections,
- Real data implementation of various demographic concepts as outlined above through practical assignments.

Unit – 1: Time Series

Time Series and its components with illustrations, additive, multiplicative and mixed models. Trend – Estimation of trend by free hand curve method, method of Semi Averages. Determination of trend by Least squares (Linear trend, parabolic trend only), Moving averages method.

Unit – 2: Seasonal Component

Determination of seasonal indices by Simple Averages method, Ratio to Moving Average, Ratio to Trend and Link Relative methods, Deseasonalization.

Unit – 3: Index numbers

Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and Weighted index numbers – Various Weighted Aggregate Index numbers, Criterion of a good index number, Fisher's ideal index number. Cost of living index number and Wholesale price index number.

Unit – 4: Vital Statistics

Introduction, definition, and uses of vital statistics, sources of vital statistics. Measures of Mortality Rates – Crude Death Rate, Specific Death Rate, Standardised Death Rate with different populations and problems.

Unit – 5:

Life table – Columns, Construction and Uses of Life table, Proofs of life table functions. Measures of Fertility Rates – Crude Birth Rate, General Fertility Rate, Specific Fertility Rate, Total Fertility Rate. Measures of population growth – Pearls, Gross Reproduction Rate, Net Reproduction Rate and its problems.

References

1. Fundamentals of Applied Statistics: V. K. Kapoor & S. C. Gupta.
2. Mukopadhyay, P (2011): Applied Statistics, 2nd ed. Revised reprint, Books and Allied Pvt. Ltd.
3. Brockwell, P.J. and Devis, R.A. (2003): Introduction to Time Series Analysis. Springer.

4. Chatfield, C. (2001): Time Series Forecasting., Chapman & Hall.
5. Srinivasan, K. (1998): Demographic Techniques and Applications. Sage Publications
6. Srivastava O.S. (1983): A Text Book of Demography. Vikas Publishing House.

404STT24: STATISTICS -5 PRACTICAL: APPLIED STATISTICS

Practical Syllabus

1. Measurement of trend by method of moving averages (odd and even period)
2. Measurement of trend by method of Least squares (linear and parabola)
3. Determination of seasonal indices by method simple averages
4. Determination of seasonal indices by method of Ratio to Moving Averages
5. Determination of seasonal indices by method of Ratio to Trend
6. Determination of seasonal indices by method of Link relatives
7. Computation of simple index numbers.
8. Computation of all weighted index numbers.
9. Computation of reversal tests.
10. Computation of various Mortality rates
11. Computation of various Fertility rates
12. Computation of various Reproduction rates.
13. Construction of Life Table.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

**B.SC- STATISTICS SYLLABUS
III YEAR- 5 SEMESTER**

501STT24: STATISTICS-6: COMPUTATIONAL STATISTICS AND R PROGRAMMING

Learning Outcomes

After learning this course the student will be able

- Be comfortable using commercial and open source tools such as the R language and its associated libraries for data analytics and visualization.
- Learn skills to analyze real time problems using R
- Able to use basic R data structures in loading, cleaning the data and preprocessing the data.
- Able to do the exploratory data analysis on real time datasets
- Able to understand and implement Linear Regression
- Able to understand and use - lists, vectors, matrices, data frames, etc

Unit – 1: Computer basics

Basic applications of computer, components of computer system, Central Processing Unit (CPU), input and output units, computer memory and mass storage devices. Programming languages and their applications. Concept of files and folders. Software and types of software. Operating System like Windows and Linux.

Unit – 2: Data processing

Data processing using spreadsheets – Data entry and editing features in Excel, copy, paste, paste special options, sort and filter options, auto sum, steps of finding average and standard deviation of data using statistical functions. Matrix operations like transpose, multiply and inverse using Excel functions. Simple graphs like bar chart, line chart and pie chart in Excel. Exporting Excel output to word processors like MS-Word and slide presentations like Power Point.

Unit – 3:

Scatter diagram, fitting of straight line, polynomial and power curves using Excel – Reading R-square value and equation from the graph. Predicting future values using ‘forecast’ and ‘trend’ functions. Data Analysis Pak and its features. Performing Student’s t-test and one- way Analysis of Variance using Data Analysis Pak. P-value and its interpretation.

Unit – 4: R Programming

Introduction to R, Features of R – Environment – R Studio. Basics of R-Assignment - Modes - Operators - special numbers - Logical values - Basic Functions - R help functions - R Data Structures - Control Structures. Vectors: Definition- Declaration - Generating - Indexing - Naming - Adding & Removing elements - Operations on Vectors - Recycling - Special Operators - Vectorized if- then else-Vector Equality – Functions for vectors - Missing values - NULL values - Filtering & Subsetting.

Unit – 5:

Matrices - Creating Matrices, Adding or Removing rows/columns, Operations. Creating Data Frames, Naming, Accessing, Adding, and Removing, Applying Special functions to Data Frames, Merging Data Frames Factors and Tables.
Exploratory Data Analysis – Descriptive Statistics – Central Tendency - Variability - Mean - Median - Range - Variance - Summary - Handling Missing values and Outliers - Normalization Data Visualization in R : Types of visualizations - packages for visualizations - Basic Visualizations, Advanced Visualizations

and Creating 3D plots.

502STT24: STATISTICS -6 PRACTICAL: COMPUTATIONAL STATISTICS AND R PROGRAMMING

Practical Syllabus

1. Installing R and R studio
2. Create a folder DS_R and make it a working directory. Display the current working directory
3. installing the "ggplot2", "caTools", "CART" packages
4. load the packages "ggplot2", "caTools".
5. Basic operations in r
6. Working with Vectors:
 - a) Create a vector v1 with elements 1 to 20.
 - b) Add 2 to every element of the vector v1.
 - c) Divide every element in v1 by 5.
 - d) Create a vector v2 with elements from 21 to 30. Now add v1 to v2.
7. Using the data present in the table given below, create a Matrix "M"

| | C1 | C2 | C3 | C4 | C5 |
|----|----|----|----|----|----|
| C1 | 0 | 12 | 13 | 8 | 20 |
| C2 | 12 | 0 | 15 | 28 | 88 |
| C3 | 13 | 15 | 0 | 6 | 9 |
| C4 | 8 | 28 | 6 | 0 | 33 |
| C5 | 20 | 88 | 9 | 33 | 0 |

Find the pairs of cities with shortest distance.

8. Consider the following marks scored by the 6 students

| Section | Student | M1 | M2 | M3 |
|---------|---------|----|----|----|
| A | 1 | 46 | 54 | 45 |
| A | 2 | 34 | 55 | 55 |
| A | 3 | 56 | 66 | 64 |
| B | 1 | 43 | 44 | 45 |
| B | 2 | 67 | 76 | 78 |
| B | 3 | 76 | 68 | 37 |

- a) create a data structure for the above data and store in proper positions with proper names
 - b) display the marks and totals for all students
 - c) Display the highest total marks in each section.
 - d) Add a new subject and fill it with marks for 2 sections.
9. Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. The individual prices and desired quantities of the commodities are given in the following table

| | Price | | | | | | |
|-------|-------|-----|----|------|-----|------|-------|
| | S1 | S2 | | | | | |
| Roll | 1.5 | 1 | | Roll | Bun | Cake | Bread |
| Bun | 2 | 2.5 | P1 | 6 | 5 | 3 | 1 |
| Cake | 5 | 4.5 | P2 | 3 | 6 | 3 | 2 |
| Bread | 16 | 17 | P3 | 3 | 4 | 3 | 1 |

- a) Create matrices for above information with row names and col names.
- b) Display the demand. quantity and price matrices
- c) Find the total amount to be spent by each person for their requirements in each shop
- d) Suggest a shop for each person to buy the products which is minimal.

10. Applying summary() to find the mean, median, standard deviation, etc
11. Implementation of Visualizations - Bar, Histogram, Box, Line, scatter plot, etc.

- References

1. Chambers, J. (2008). Software for Data Analysis: Programming with R, Springer.
2. Crawley, M.J. (2017). The R Book, John Wiley & Sons.
3. Matloff, N. (2011). The Art of R Programming, No Starch Press, Inc.
4. Dr. Mark Gardener(2012): Beginning R The statistical Programming Languages, John Wiley & Sons.
5. Sudha G. Purohit, SharadD.Gore, and ShailajaR.Deshmukh (2008), Statistics Using R, NarosaPublishing House, India.
6. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc.,2012.
7. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.
8. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”,Wiley, 2011.
9. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.

- Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

**B.SC- STATISTICS SYLLABUS
III YEAR- 5 SEMESTER**

503STT24: STATISTICS-7: STATISTICAL QUALITY CONTROL

Learning Outcomes

After learning this course, the student will be able

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

Unit – 1:

Importance of SQC – 4 M's of SQC, causes of variation – Assignable and chance cause of variation, uses, process and product control, Control charts technique, Statistical basis of Shewhart control charts.

Unit – 2: Control charts for Variables

Introduction and Construction of Mean and Range chart; Mean and Standard Deviation Chart when standards are specified and unspecified, corrective action if the process is out of statistical control.

Unit – 3: Control charts for Attributes

Introduction and Construction of fraction defective chart, number of defectives chart, no. of defects per unit Chart and U charts when standards are specified and unspecified, corrective action if the process is out

of statistical control.

Unit – 4:

Acceptance Sampling for Attributes: Introduction, Concept of sampling inspection plan, Comparison between 100% inspection and sampling inspection. Procedures of acceptance sampling with rectification, Producer's risk and Consumer's risk, Operating characteristic (OC) curve, Acceptable Quality Level (AQL), Lot Tolerance Fraction Defective (LTFD) and Lot Tolerance percent Defective (LTPD), Average Outgoing Quality (AOQ) and Average Outgoing Quality Limit (AOQL), AOQ curve, Average Sample Number (ASN), Average Total Inspection (ATI).

Unit – 5:

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

References

1. Montgomery, D. C. (2008): Statistical Quality Control, 6thEdn., John Wiley, New York.
2. Parimal Mukhopadhyay: Applied Statistics, New Central Book Agency.
3. Goon A.M., Gupta M.K. and Das Gupta B. (1986): Fundamentals of Statistics, Vol. II, World Press, Calcutta.
4. S.C. Gupta and V.K. Kapoor: Fundamentals of Applied Statistics – Chand publications.
5. R.C. Gupta: Statistical Quality Control.
6. Duncan A.J. (1974): Quality Control and Industrial Statistics, fourth edition
7. D.B. Taraporewala Sons and Co. Pvt. Ltd., Mumbai.

504STT24: STATISTICS -7 PRACTICAL: STATISTICAL QUALITY CONTROL

Practical Syllabus

1. Construction of Mean and R Charts.
2. Construction of Mean and Standard deviation charts.
3. Construction of p Chart for fixed sample size.
4. Construction of p Chart for variable sample size.
5. Construction of np Chart.
6. Construction of C chart.
7. Construction of U chart.
8. Single sampling plan for attributes (OC Curve, Producer's and Consumer's risks, AOQ, AOQL, ATI).
9. Determination of single sampling plan by: a) lot quality approach b) average quality approach.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc

B.Sc – Computer Science

I B.Sc - Semester-1

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|-------------|---|---------------------|----------------|-----------|---------|
| 101CSC24 | Computer Science-1: Problem Solving using C | 30 | 70 | 100 | 3 |
| 102CSC24 | Computer Science-1 Practical: Problem Solving using C - LAB | - | - | 50 | 2 |

101CSC24: Computer Science-1: Problem Solving using C

Course Objectives

- To explore basic knowledge on computers
- Learn how to solve common types of computing problems.
- Learn to map problems to programming features of C.
- Learn to write good portable C programs.

Course Outcomes

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

- Understand the working of a digital computer and Fundamental constructs of Programming
- Analyze and develop a solution to a given problem with suitable control structures
- Apply the derived data types in program solutions
- Use the 'C' language constructs in the right way
- Apply the Dynamic Memory Management for effective memory utilization

SYLLABUS:

UNIT-I

Introduction to computer and programming: Introduction, Basic block diagram and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high-level programming, Flowcharts and Algorithms

Fundamentals of C: History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input/output statements in C-Formatted and Unformatted I/O

UNIT-II

Control statements: Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break, continue and goto.

UNIT-III

Derived data types in C: Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation.

Strings: Declaring & Initializing string variables; String handling functions, Character handling functions

UNIT-IV

Functions: Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion, Parameter Passing by address & by value. Local and Global variables. Storage classes: automatic, external, static and register.

Pointers: Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions.

UNIT-V

Dynamic Memory Management: Introduction, Functions-malloc, calloc, realloc, free

Structures:

Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers. Unions - Union definition; difference between Structures and Unions.

Referencws

1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 6th Edn, ISBN-13: 978- 1- 25-90046-2
2. Herbert Schildt, —Complete Reference with C, Tata McGraw Hill, 4th Edn., ISBN- 13: 9780070411838, 2000
3. Computer fundamentals and programming in C, REEMA THAREJA, OXFORD UNIVERSITY PRESS

102CSC24: Computer Science-1: Problem Solving using C Lab

List of Experiments

1. A. Write a program to calculate simple & compound interest
B. Write a C program to interchange two numbers.
2. Find the biggest of three numbers using C.
3. Write a c program to find the sum of individual digits of a positive integer.
4. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
5. Write a c program to check whether a number is Armstrong or not.
6. Write a c program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a c program that implements searching of given item in given list
8. Write a c program that uses functions to perform the following: Addition of two matrices.
Multiplication of two matrices.
9. Write a program for concatenation of two strings.
10. Write a program for length of a string with and without String Handling functions
11. Write a program to demonstrate Call by Value and Call by Reference mechanism
12. Write a Program to find GCD of Two numbers using Recursion
13. Write a c program to perform various operations using pointers.
14. Write a c program to read data of 10 employees with a structure of 1.employee id, 2.address, 3.title, 4.joined date, 5.salary, 6.date of birth, 7.gender, 8.department.
15. Write a Program to demonstrate dynamic arrays using Dynamic Memory Management functions

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|-------------|---|---------------------|----------------|-----------|---------|
| 201CSC24 | Computer Science-2: Digital Logic Design | 30 | 70 | 100 | 3 |
| 202CSC24 | Computer Science-2: Practical: Digital Logic Design Lab | - | - | 50 | 2 |

201CSC24: Computer Science-2: Digital Logic Design

Course Objectives

To familiarize with the concepts of designing digital circuits.

Course Outcomes

Upon successful completion of the course, the students will be able to

- Understand how to Convert numbers from one radix to another radix and perform arithmetic operations.
- Simplify Boolean functions using Boolean algebra and k- maps
- Design adders and subtractors circuits
- Design combinational logic circuits such as decoders, encoders, multiplexers and demultiplexers.
- Use flip flops to design registers and counters.

SYLLABUS:

UNIT – I

Number Systems: Binary, octal, decimal, hexadecimal number systems, conversion of numbers from one radix to another radix, r 's, $(r-1)$'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and unweighted codes.

UNIT – II

Logic Gates and Boolean Algebra: NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions.

UNIT – III

Combinational Logic Circuits – 1: Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors, ripple adder / subtractor.

UNIT – IV

Combinational Logic Circuits – 2: Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders, demultiplexers and multiplexers, realization of Boolean functions using decoders, multiplexers.

UNIT – V

Sequential Logic Circuits: Classification of sequential circuits, latch and flip-flop, RS- latch using NAND and NOR Gates, truth tables, RS, JK, T and D flip-flops, truth and excitation tables, conversion of flip- flops, flip-flops with asynchronous inputs (preset and clear). Design of registers, shift registers, bidirectional shift registers, universal shift register, design of ripple counters, synchronous counters and variable modulus counters.

References:

1. M. Morris Mano, Michael D Ciletti, "Digital Design", 5th edition, PEA.
2. Kohavi, Jha, "Switching and Finite Automata Theory", 3rd edition, Cambridge.
3. 2. Leach, Malvino, Saha, "Digital Principles and Applications", 7th edition, TMH.
4. 3. Roth, "Fundamentals of Logic Design", 5th edition, Cengage.

202CSC24: Computer Science-2: Digital Logic Design Lab

List of Experiments

Simulators: <https://sourceforge.net/projects/gatesim/>

or <https://circuitverse.org/> or any free open- source simulator

- 1.Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
- 2.Implementation of the given Boolean functions using logic gates in both SOP and POS forms
- 3.Realization of basic gates using universal gates.
- 4.Design and implementation of half and full adder circuits using logic gates.
- 5.Design and implementation of half and full subtractor circuits using logic gates.
- 6.Verification of stable tables of RS, JK, T and D flip-flops using NAND gates.
- 7.Verification of stable tables of RS, JK, T and D flip-flops using NOR gates.
- 8.Implementation and verification of Decoder and encoder using logic gates.
- 9.Implementation of 4X1 MUX and DeMUX using logic gates.
- 10.Implementation of 8X1 MUX using suitable lower order MUX.
- 11.Implementation of 7-segment decoder circuit.
- 12.Implementation of 4-bit parallel adder.
- 13.Design and verification of 4-bit synchronous counter.
- 14.Design and verification of 4-bit asynchronous counter.

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|-------------|--|---------------------|----------------|-----------|---------|
| 301CSC24 | Computer Science-3: Data Structures in C | 30 | 70 | 100 | 3 |
| 302CSC24 | Computer Science-3 Practical: Data Structures in C Lab | - | - | 50 | 2 |

301CSC24: Computer Science-3: Data Structures in C

Course Objectives

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

Course Outcomes

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

- Understand various Data Structures for data storage and processing.
- Realize Linked List Data Structure for various operations
- Analyze step by step and develop algorithms to solve real world problems by implementing Stacks, Queues data structures.
- Understand and implement various searching & sorting techniques.
- Understand the Non-Linear Data Structures such as Binary Trees and Graphs

SYLLABUS:

UNIT-I

Basic Concepts: Pointers and dynamic memory allocation, Algorithm-Definition and characteristics, Algorithm Analysis-Space Complexity, Time Complexity, Asymptotic Notation

Introduction to Data structures: Definition, Types of Data structure, Abstract Data Types (ADT), Difference between Abstract Data Types, Data Types, and Data Structures.

Arrays-Concept of Arrays, Single dimensional array, Two dimensional array, Operations on arrays with Algorithms (searching, traversing, inserting, deleting)

UNIT-II

Linked List: Concept of Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array, Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list;

Implementation of Linked List ADT: Creating a List, Traversing a linked list, Searching linkedlist, Insertion and deletion into linked list (At first Node, Specified Position, Last node), Application of linked lists

UNIT-III

Stacks:

Introduction to stack ADT, Representation of stacks with array and Linked List, Implementation of stacks, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation - Tower of Hanoi, Recursion: Concept and Comparison between recursion and Iteration

Queues:

Introduction to Queue ADT, Representation of Queues with array and Linked List, Implementation of Queues, Application of Queues Types of Queues- Circular Queues, De-queues, Priority Queue

UNIT-IV

Searching: Linear or Sequential Search, Binary Search and Indexed Sequential Search

Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort and Merge Sort

UNIT-V

Binary Trees: Concept of 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, Applications of Binary Tree.

Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs (DFS, BFS), Application of Graphs.

References:

1 Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India.

2A.K. Sharma ,Data Structure Using C, Pearson Education India.

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

302CSC24: Computer Science-3: Data Structures in C Lab

List of Experiments:

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
 - a. Add an element at the beginning of an array
 - b. Insert an element at given index of array
 - c. Update an element using a values and index
 - d. Delete an existing element
2. Write Program to implement Single Linked List with insertion, deletion and traversal operations
3. Write Program to implement Circular doubly Linked List with insertion, deletion and traversal operations
4. Write Programs to implement the Stack operations using an array
5. Write a program using stacks to convert a given infix expression to postfix
6. Write Programs to implement the Stack operations using Liked List.
7. Write Programs to implement the Queue operations using an array.
8. Write Programs to implement the Queue operations using Liked List.
9. Write a program for Binary Search Tree Traversals
10. Write a program to search an item in a given list using the following Searching Algorithms
 - a. Linear Search
 - b. Binary Search.
11. Write a program for implementation of the following Sorting Algorithms
 - a. Bubble Sort
 - b. Insertion Sort
 - c. Quick Sort

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|-------------|---|---------------------|----------------|-----------|---------|
| 401CSC24 | Computer Science-4: Object Oriented Programming using Java | 30 | 70 | 100 | 3 |
| 402CSC24 | Computer Science-4 Practical: Object Oriented Programming using Java Lab | - | - | 50 | 2 |

401CSC24: Computer Science-4: Object Oriented Programming using Java

Course Objectives

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

Course Outcomes

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

- Understand the basic concepts of Object-Oriented Programming and Java Program Constructs
- Implement classes and objects and analyze Inheritance and Dynamic Method Dispatch
- Demonstrate various classes in different packages and can design own packages
- Manage Exceptions and Apply Threads
- Create GUI screens along with event handling

SYLLABUS:

UNIT-I

OOPs Concepts and Java Programming: Introduction to Object-Oriented concepts, procedural and object-oriented programming paradigm

Java programming: An Overview of Java, Java Environment, Data types, Variables, constants, scope and life time of variables, operators, type conversion and casting, Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(), Control Statements

UNIT-II

Arrays, Command Line Arguments, Strings-String Class Methods

Classes & Objects: Creating Classes, declaring objects, Methods, parameter passing, static fields and methods, Constructors, and 'this' keyword, overloading methods and access

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, 'super' keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: Dynamic binding, method overriding, abstract classes and methods;

UNIT-III

Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface;

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exceptionsub classes.

UNIT-IV

Multithreading: Differences between multiple processes and multiple threads, thread states, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, The Console class, Serialization

UNIT-V

GUI Programming with Swing- Introduction, MVC architecture, components, containers. Understanding Layout Managers - Flow Layout, Border Layout, Grid Layout, Card Layout, GridBag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

References:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill.

2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

402CSC24: Computer Science-4: Object Oriented Programming using Java Lab

List of Experiments

1. Write a Java program to print Fibonacci series using for loop.
2. Write a Java program to calculate multiplication of 2 matrices.
3. Create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user.
4. Write a Java program that implements method overloading.
5. Write a Java program for sorting a given list of names in ascending order.
6. Write a Java program that displays the number of characters, lines and words in a text file.
7. Write a Java program to implement various types of inheritance
 - i. Single
 - ii. Multi-Level
 - iii. Hierarchical
 - iv. Hybrid
8. Write a java program to implement runtime polymorphism.
9. Write a Java program which accepts withdraw amount from the user and throws an exception "In Sufficient Funds" when withdraw amount more than available amount.
10. Write a Java program to create three threads and that displays "good morning", for every one second, "hello" for every 2 seconds and "welcome" for every 3 seconds by using extending Thread class.
11. Write a Java program that creates three threads. First thread displays "OOPS", the second thread displays "Through" and the third thread Displays "JAVA" by using Runnable interface.
12. Implement a Java program for handling mouse events when the mouse entered, exited, clicked, pressed, released, dragged and moved in the client area.
13. Implement a Java program for handling key events when the key board is pressed, released, typed.
14. Write a Java swing program that reads two numbers from two separate text fields and display sum of two numbers in third text field when button "add" is pressed.
15. Write a Java program to design student registration form using Swing Controls. The form which having the following fields and button SAVE

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|-------------|--|---------------------|----------------|-----------|---------|
| 403CSC24 | Computer Science-5: Computer Organization | 30 | 70 | 100 | 3 |
| 404CSC24 | Computer Science-5 : Computer Organization Lab | | | | |

403CSC24: Computer Science-5: Computer Organization

Course Objectives

To familiarize with organizational aspects of memory, processor and I/O.

Course Outcomes

Upon successful completion of the course, the students will be able to

- Identify different types of instructions
- Differentiate between micro-programmed and hard-wired control units.
- **Analyse the performance of hierarchical organization of memory.**
- **Summarize** different data transfer techniques.
- Demonstrate arithmetic operations on fixed- and floating-point numbers and illustrate concepts of parallel processing.

SYLLABUS:

UNIT – I

Register Transfer Language and Micro Operations: Introduction- Functional units, computer registers, register transfer language, register transfer, bus and memory transfers, arithmetic, logic and shift micro-operations, arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, instruction cycle.

Register reference instructions, Memory – reference instructions, input – output and interrupt.

UNIT – II

CPU and Micro Programmed Control: Central Processing unit: Introduction, instruction formats, addressing modes. Control memory, address sequencing, design of control unit - hard wired control, micro programmed control.

UNIT – III

Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache Memory and mappings.

UNIT – IV

Input-Output Organization: Peripheral Devices, input-output interface, asynchronous data transfer, modes of transfer- programmed I/O, priority interrupt, direct memory access, Input – Output Processor (IOP).

UNIT – V

Computer Arithmetic and Parallel Processing: Data representation- fixed point, floating point, addition and subtraction, multiplication and division algorithms.

Parallel Processing-Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline

References:

1. M. Moris Mano, "Computer Systems Architecture", 3rd edition, Pearson/ PHI.
2. Carl Hamacher, ZvonksVranesic, SafeaZaky, "Computer Organization", 5th edition, McGraw Hill.
3. William Stallings, "Computer Organization and Architecture", 8th edition, Pearson/PHI.

404 CSC24: Computer Science-5: Computer Organization Lab

Lab Experiments

1. Implement a C program to convert a Hexadecimal, octal, and binary number to decimal number vice versa.
2. Implement a C program to perform Binary Addition & Subtraction.
3. Implement a C program to perform Multiplication of two binary numbers.
4. Implement arithmetic micro-operations using logic gates.
5. Implement logic and shift micro-operations using logic gates.
6. Implement a C program to perform Multiplication of two binary numbers (signed) using Booth's Algorithms.
7. Implement a C program to perform division of two binary numbers (Unsigned) using restoring division algorithm.
8. Implement a C program to perform division of two binary numbers (Unsigned) using non-restoring division algorithm.
9. Write assembly language code for $A+B*(C-D)$ using various instruction formats in MASM or any open-source assembler.
10. Write assembly language code for $A+B*C$ using various addressing modes in MASM or any open-source assembler.

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|-------------|---|---------------------|----------------|-----------|---------|
| 501CSC24 | Computer Science-6: Database Management Systems | 30 | 70 | 100 | 3 |
| 502CSC24 | Computer Science-6 Practical: : Database Management Systems Lab | - | - | 50 | 2 |

501CSC24: Computer Science-6 : Database Management Systems

Course Objectives

To familiarize with concepts of database design

Course Outcomes:

On successful completion of the course, students will be able to

- Differentiate between database systems and file based systems
- Design a database using ER model
- Use relational model in database design
- Use SQL commands for creating and manipulating data stored in databases.
- Write PL/SQL programs to work with databases.

SYLLABUS:

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, 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.

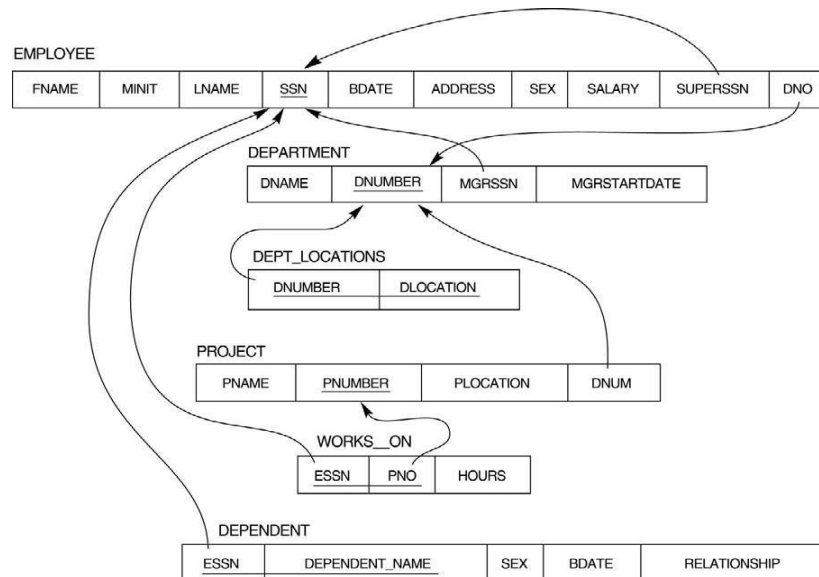
References:

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

502CSC24: Computer Science-6 : Database Management Systems 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)
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 'Product X' 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 10.
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.

| Course code | Name of the Course | Internal Assessment | External Exams | Max Marks | Credits |
|-------------|---|---------------------|----------------|-----------|---------|
| 503CSC24 | Computer Science-7: Operating Systems | 30 | 70 | 100 | 3 |
| 504CSC24 | Computer Science-7 Practical: Operating Systems Lab | - | - | 50 | 2 |

503CSC24: Computer Science-7: Operating Systems

Course Objectives

To gain knowledge about various functions of an operating system like memory management, process management, device management, etc.

Course Outcomes:

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

- Demonstrate knowledge and comprehension of operating system functions.
- Analyze different process scheduling algorithms and apply them to manage processes and threads effectively
- Create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems.
- Compare and contrast different memory allocation strategies and evaluate their effectiveness
- Evaluate disk scheduling algorithms while implementing OS security measures

SYLLABUS:

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, Disk Scheduling algorithms.

References:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and GregGagne (7th Edition) Wiley India Edition.
2. Operating Systems: Internals and Design Principles by Stallings (Pearson)
3. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)

504CSC24: Computer Science-7: Operating Systems Lab

List of Experiments:

III Semester

Course 8: Operating Systems

Credits -1

1. Illustrate the LINUX commands

- a) pwd
- b) mkdir
- c) rmdir
- d) grep
- e) chmod
- f) ls
- g) rm
- h) cp

2. Write a program to calculate average waiting time and turn around time of each process using the following CPU Scheduling algorithm for the given process schedules.

- a) FCFS
- b) SJF
- c) Priority
- d) Round Robin

3. Simulate MVT and MFT memory management techniques

4. Write a program for Bankers Algorithm for Dead Lock Avoidance

5. Implement Bankers Algorithm Dead Lock Prevention.

6. Write a program to simulate Producer-Consumer problem.

7. Simulate all Page replacement algorithms.

- e) FIFO
- f) LRU
- g) LFU
- h) Optimal

8. Simulate Paging Techniques of memory management

9. Simulate the following disk scheduling algorithms

- a) FCFS
- b) SSTF
- c) SCAN
- d) CSCAN

Duration of the Programme:

Minimum: Three Academic Years from the year of joining of the course (Six Semesters).

Maximum: Seven Academic Years from year of joining of the course for securing First Class or Second Class.

INSTRUCTIONAL DESIGN :**Instructional delivery mechanism:**

Senior faculty members from HEI (Conventional Mode) will act as resource person for will act as resource persons for this program. Our University has blended mode delivery mechanism i.e., ICT and Conventional modes.

Media of delivery mechanisms:

- **Printing:** The study material delivery media include Printing of books which are issued to the students who are enrolled for the programme.
- **Online:** On line PDF format content is also given access to the students who wish to study through online mode.
- **Interactive sessions, and Discussion boards:** In distance Education, face to face contact between the learners and their tutors is relatively less and therefore interactive sessions are conducted. The purpose of such interactive session is to answer some of the questions and clarify doubts that may not be possible in other means of communication. This programme provides an opportunity to meet other fellow students. The Counsellors at the study centres are expected to provide guidance to the students. The interactive sessions are conducted during week ends and vacations to enable the working students to attend.
- **Student support services:** Student support services include Internet enabled student support services like e-mails, SMS and even an app is planned. Student feed back mechanism is created and feed back is designed. Student Learning Management System (LMS) is customized to every student. For every student customized examination management system (EMS) is also created facilitating self evaluation, demo tests, model question papers and periodical Internal Assessments.
- **Credit System:** University has adopted Choice Based Credit System (CBSE) under semester mode from 2013. The same has been approved by relevant Statutory boards in Distance mode also.
- **Admission procedure:** In Bachelor of Sciences Maths, Statistics, Computer Science, programme candidates can take admission directly. For this purpose, CDE, ANU will advertise for admissions. Then candidates should apply in prescribed format of the CDE after publication of the advertisement.
- **Eligibility Criteria:** The minimum eligibility for admission for this course is 10+2 stream pass or Open University System (through entrance test).
- **Fee Structure:** The total course fee is Rs.34,030/-.
- **Policy of programme delivery:** Our University has blended mode delivery mechanism i.e., ICT and Conventional modes. In conventional mode printed material is given and also online mode of delivery with learning management system is adopted.

- **Activity planner:** There is an yearly academic plan and as per plan interactive sessions, assignments, examinations etc are conducted to the candidates.
- **Evaluation System:** Periodical progress of learning is evaluated by web based feed back mechanism in the Learning Management System. Evaluation of learner progress is conducted as follows:
 - (i) The examination has two components i.e., continuous evaluation by way of assignments (30 %) and term end University Examination (70 %).
 - (ii) Each student has to complete and submit assignment in each of the theory paper before appearing to the term end examination. The term end examination shall be of 3 hours duration.
 - (iii) Minimum qualifying marks in each paper is 40 % individually in internal and term end examination. The candidates who get 60 % and above will be declared as passin First Division, 50 % to below 60 % as Second Division and 40 % to below 50 % as Third Division.
 - (iv) The Centre for Distance Education, Acharya Nagarjuna University will conduct the examinations, evaluations and issue certificates to the successful candidates.
 - (v) All the term end examinations will be conducted at the examination centres fixed by the CDE.
 - (vi) Qualitatively the examinations conducted for the students of the Distance Education are on par with the examinations conducted for the regular University students.

LIBRARY SUPPORT AND LIBRARY RESOURCES :


The Bachelor of Sciences Maths, Statistics, Computer Science program is based on the theory and practical papers. Laboratory support is available to students. Further, entire University Library is accessible to all the students of distance education. Additionally every department in the University has a well equipped library which is accessible to all the students. CDE also provides a compendium of web resources to every student to support learning.


COST ESTIMATE :

The Programme fee for I year is Rs.10,300/-, II year is Rs.12,100/- and III year is Rs.11,630/- . The university will pay the remuneration to Editors and lesson writers as per university norms. DTP charges, Printing of books and Examination fees will be paid by the ANUCDE as per prescribed norms. This institution is providing high quality programmes at low cost.

QUALITY ASSURANCE :

Quality assurance comprises the policies, procedures and mechanisms which that specified quality specifications and standards are maintained. These include continuous revision and monitoring activities to evaluate aspects such as suitability, efficiency, applicability and efficacy of all activities with a view to ensure continuous quality improvement and enhancement. The programme is designed with a focus on the proposed learning outcomes aimed at making the learner industry ready also for career advancement, enterprenureal development, and as wealth creators. There is a continuous evaluation of learning and of competence internally and also by ICT enabled feed back mechanism and Centre for Internal Quality Assurance (CIQA). The University ensures maintaining quality in education provided through open and diatance learning mode. As per the need of the information society and professional requirement, the University ensures to change the mechanism from time to time along with enhancement of standard in course curriculum and instructional design. Therefor, the outcomes of the programme can meet the challenges in the changing society.


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