ACHARYA NAGARJUNA UNIVERSITY

CENTRE FOR DISTANCE EDUCATION

NAGARJUNA NAGAR,

GUNTUR

ANDHRA PRADESH

PROGRAM PROJECT REPORT

60. BACHELOR OF SCIENCE (MATHEMATICS, PHYSICS, CHEMISTRY)

Bachelor of Science - (Maths, Physics, Chemistry)
PROGRAMME CODE: 60

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, Physics, Chemistry, 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 vission and mission.

NATURE OF PERSPECTIVE TARGET GROUP OF LEARNERS :

Aim of open and distance eduation 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. House wives, Dropouts, rural dwellers unskilled men, low level income group people in the society etc. who are unable to continue their studies due to various reasons can continue their studies with this program.

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 availble in order to elevate the status of the marginalised sections of the society especcially 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, Physics, Chemistry propgramme 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, anylitical 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, Physics, Chemistry)
Programme Code: 60
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
101PHY24	Physics-1: Mechanics, Waves & Oscillations	30	70	100	3
102PHY24	Physics-1 Practical: Mechanics, Waves & Oscillations	-	-	50	2
101CHE24	Chemistry-1: General and Inorganic Chemistry	30	70	100	3
102CHE24	Chemistry-1 Practical: General and Inorganic Chemistry	-	-	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
201PHY24	Physics-2: Wave Optics	30	70	100	3
202PHY24	Physics-2 Practical: Wave Optics	-	-	50	2

201CHE24	Chemistry-2: Fundamentals in Organic Chemistry	30	70	100	3
202CHE24	Chemistry-2 Practical: Fundamentals in Organic Chemistry	-	-	50	2
201FPA21	First Phase of Apprenticeship Between 1st year and 2nd 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
301PHY24	Physics-3: Heat & Thermodynamics	30	70	100	3
302PHY24	Physics-3 Practical: Heat & Thermodynamics	-	-	50	2
301CHE24	Chemistry-3: Physical Chemistry- Ii (States of Matter, Phase Rule & Surface Chemistry)	30	70	100	3
302CHE24	Chemistry-3 Practical: Physical Chemistry- Ii (States of Matter, Phase Rule & Surface Chemistry)	-	-	50	2
SEMESTER - IV					
401MAT24	Mathematics-4: Introduction to Real Analysis	30	70	100	5
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
401PHY24	Physics-4: Electricity, Magnetism & Electronics	30	70	100	3
402PHY24	Physics-4 Practical: Electricity, Magnetism & Electronics	-	-	50	2
403PHY24	Physics-5: Modern Physics	30	70	100	3
404PHY24	Physics-5 Practical: Modern Physics	-	-	50	2
401CHE24	Chemistry-4: General and Physical Chemistry	30	70	100	3
402CHE24	Chemistry-4 Practical: General and Physical Chemistry	-	-	50	2
403CHE24	Chemistry-5: Analytical Methods in Chemistry- Quantitative Analysis	30	70	100	3
404CHE24	Chemistry-5 Practical: Analytical Methods in Chemistry- Quantitative	-	-	50	2

	Analysis				
401SPA21	Second Phase of Apprenticeship Between 2nd year and 3rd 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
501PHY24	Physics-6: Low Temperature Physics & Refrigeration	30	70	100	3
502PHY24	Physics-6 Practical: Low Temperature Physics & Refrigeration	-	-	50	2
503PHY24	Physics-7: Solar Energy & Applications	30	70	100	3
504PHY24	Physics-7 Practical: Solar Energy & Applications	-	-	50	2
501CHE24	Chemistry-6: Chromatography and Instrumental Methods Of Analysis	30	70	100	3
502CHE24	Chemistry-6 Practical: Chromatography and Instrumental Methods Of Analysis	-	-	50	2
503CHE24	Chemistry-7: Synthetic Organic Chemistry	30	70	100	3
504CHE24	Chemistry-7 Practical: Synthetic Organic Chemistry	-	-	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

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 ఆదికవి నన్నయ 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 మెలకువలను గ్రహించగలరు.

పాఠ్య ప్రణాళిక

యూనిట్-I

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

యూనిట్-II

దక్షయజ్ఞం — నన్నెచోడుడు *శ్లోక రూప (ప్రశ్నలు మాత్రమే*
కుమారసంభవం-ద్వితీయాశ్వాసం-(49-86 పద్యాలు)

యూనిట్-III

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

యూనిట్-IV

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

యూనిట్-V

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

◆ వ్యాకరణం

సంధులు: ఉత్వ, త్రిక, ద్రుత(ప్రకృతిక) ఱుగాగమ ద్విరుక్తటకారాదేశ యణాదేశ, వృద్ధి, శ్చుత్వ, జశ్త్వ, అనునాసిక సంధులు.

సమాసాలు: అవ్యయీభావ, తత్పురుష, కర్మధారయ, ద్వంద్వ, ద్విగు, బహుప్రీహి.

అలంకారాలుః

అర్థాలంకారాలు ః ఉపమ, ఉత్ప్రేక్ష, రూపక, స్వభావోక్తి, అర్థాంతరన్యాస, అతిశయోక్తి.

శబ్దాలంకారాలు ః అనుప్రాస (వృత్యనుప్రాస, ఛేకానుప్రాస లాటానుప్రాస, అంత్యానుప్రాస)

ఛందస్సు

వృత్తాలు: ఉత్పలమాల, చంపకమాల, శార్దూలము, మత్తేభము;

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

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 पत्र।
3. शुल्क भरने के लिए पैसे भेजने अपने पिता के नाम पत्र।

Dr. G VIJAYA RATNA KUMAR
(U.G)

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, Gorakhpoor.

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: 3Professional 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.కాం., 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 కవితాలక్షణాలను 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.o.S.

పాఠ్య ప్రణాళిక

యూనిట్-I : ఆధునిక కవిత్వం

1. ఆధునిక కవిత్వం – పరిచయం

2. కొండవీడు   – దువ్వూరి రామిరెడ్డి

            ('కవికోకిల' గ్రంథావళి–ఖండకావ్యాలు–నక్షత్రమాల సంపుటి నుండి)

3. మాతృసంగీతం   – అనిసెట్టి సుబ్బారావు ('అగ్నివీణ' కవితాసంపుటి నుండి)

4. 'తాతకో నూలుపోగు'   – బండారు ప్రసాదమూర్తి ('కలనేత' కవితాసంపుటి నుండి)

యూనిట్-II : కథానిక

5. తెలుగు కథానిక – పరిచయం

6. భయం (కథ)   – కాళీపట్నం రామారావు

7. స్వేదం ఖరీదు....? – (కథ)   – రెంటాల నాగేశ్వరరావు

యూనిట్-III : నవల

8. తెలుగు 'నవల'   – పరిచయం

9. రథచక్రాలు (నవల) – మహీధర రామ్మోహన రావు (సంక్షిప్త ఇతివృత్తం మాత్రం)

10. రథచక్రాలు (సమీక్షా వ్యాసం) – డా॥ యల్లాప్రగడ మల్లికార్జునరావు

యూనిట్-IV: నాటకం

11. తెలుగు 'నాటకం' – పరిచయం

12. యక్షగానము (నాటిక)   – ఎం.వి.ఎస్. హరనాథరావు.

13. "అపురూప 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. O. S

ఆధార 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 స్వీయ 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 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 – II

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

UNIT – I OLD POETRY: 1."Indumateeswayamvaram'', Raghuvamsam of kalidasa,
                                             6[th]canto, Chowkhamba krishadas academy, Varanasi-2012.

                                          2. "Deekshaapradanam'', Buddacharitam of Aswagosha,
                                             16[th]canto. 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 GurramJashua (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 forenergy 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.

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. Wikiepedia
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.కాం., బి.యస్సి., 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 పటిష్ఠతకు భాష ప్రధానమని తెలుసుకుంటారు. తెలుగుభాషలోని కీలకాంశాలైన 'వర్ణం-పదం-వాక్యా'ల ప్రాధాన్యాన్ని గుర్తిస్తూ, వాగ్రూప- లిఖితరూప వ్యక్తీకరణ ద్వారా భాషానైపుణ్యాలను మెరుగుపరచుకోగలరు.

3. భాషానైపుణ్యాలను అలవరచుకోవడంతోపాటు వినియోగించడం నేర్చుకుంటారు. రచనా, భాషణానైపుణ్యాలను 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 అందిపుచ్చుకోగలరు.

6. అనువాద రంగంలో నైపుణ్యం సంపాదించగలరు.

CHAIRMAN
B.O.S, Telugu.

పాఠ్య ప్రణాళిక

యూనిట్-I: వ్యక్తీకరణ నైపుణ్యాలు

1. భాష-ప్రాథమికాంశాలు: భాష-నిర్వచనం, లక్షణాలు, అవశ్యకత, ప్రయోజనాలు

2. వర్ణం-పదం-వాక్యం', వాక్య లక్షణాలు, సామాన్య-సంయుక్త-సంశ్లిష్టవాక్యాలు

3. భాషా నిర్మాణంలో 'వర్ణం-పదం-వాక్యం' ప్రాధాన్యత

యూనిట్-II సృజనాత్మక రచన

4. కవితా రచన   :   ఉత్తమ కవిత – లక్షణాలు

5. కథారచన   :   ఉత్తమ కథ – లక్షణాలు

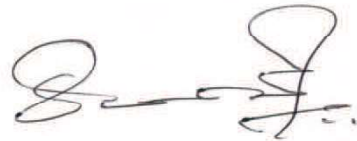6. వ్యాస రచన   :   ఉత్తమ వ్యాసం-లక్షణాలు

యూనిట్-III: అనువాద రచన

7. అనువాదం-నిర్వచనం, అనువాద పద్ధతులు,

8. అనువాద సమస్యలు-భౌగోళిక,భాషా,సాంస్కృతిక సమస్యలు, పరిష్కారాలు

9. అభ్యాసము : ఆంగ్లం నుండి తెలుగుకు,తెలుగు నుండి ఆంగ్లానికి ఒక పేరానుఅనువదించడం

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

10. ముద్రణామాధ్యమం (అచ్చుమాధ్యమం) : పరిచయం, పరిధి, వికాసం

11. వివిధ రకాల పత్రికలు-పరిశీలన,   పత్రికాభాష, శైలి, వైవిధ్యం

12. పత్రికా రచన : వార్తా రచన, సంపాదకీయాలు, సమీక్షలు-అవగాహన

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

13. ప్రసారమాధ్యమాలు : నిర్వచనం, రకాలు, విస్తృతి, ప్రయోజనాలు

14. శ్రవణ మాధ్యమాలు – రచన: రేడియో రచన, ప్రసంగాలు, నాటికలు, ప్రసార సమాచారం

15. దృశ్యమాధ్యమాలు – రచన: వ్యాఖ్యానం (యాంకరింగ్), టెలివిజన్ రచన

ఆధార గ్రంథాలు/వ్యాసాలు:

1. వ్యక్తీకరణ నైపుణ్యాలు – చూ. 1. ఆధునిక భాషాశాస్త్ర సిద్ధాంతాలు–ఆచార్య పి.ఎస్. సుబ్రహ్మణ్యం

                                               2. తెలుగు భాషా చరిత్ర – సం.ఆచార్య భద్రిరాజు 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 చదివింపచేయడం మొదలైనవి.

4. వివిధ కార్యక్రమాల్లో విద్యార్థులచేత సదస్సు నిర్వహణ, వ్యాఖ్యానం (యాంకరింగ్) చేయించడం.

5. సమకాలీన భాషాసమస్యలపై / ఉద్యమాలపై/సాంఘిక సమస్యలపై 'బృందచర్చ' (Group Discussion) నిర్వహింపచేయడం.

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 KUM.
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, Gorakhpoor.

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 - <u>Personality Enhancement & Leadership</u>
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

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 andNatural 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 waterresources 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 Commmission) 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,

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) $\dfrac{1}{Mx+Ny}$ iii) $\dfrac{1}{Mx-Ny}$

Unit-2
Differential Equations of first order but not of first degree

Equations solvable for p , Equations solvable for y , 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

$\quad$ (i) $\quad$ Q(x) = e^{ax} $\quad$ (ii) $\quad$ $Q(x) = Sin\ ax$ (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 UniversityPress.

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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

*****

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 Ringsand 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 clearideaabouttherealnumbersandrealvaluedfunctions.
- obtaintheskillsofanalysingtheconceptsandapplyingappropriatemethodsfortesting convergence of a sequence/ series.
- testthecontinuityand differentiabilityandRiemannintegrationofafunction.
- knowthegeometricalinterpretationofmeanvalue theorems.
- know about the fundamental theorem of integral calculus

Course Contents
Unit – 1 REAL NUMBERS, REAL SEQUENCES
The algebraic and order properties of R - Absolute value and Real line - Completeness property of 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 - Subsequencesand the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence.

Unit – 2 INFINITIE SERIES
Introductiontoseries -convergenceofseries -Cauchy'sgeneralprincipleof convergencefor series tests for convergence of series - Series of non-negative terms - P-test - Cauchy'snth roottest -D'- Alembert'sTest-AlternatingSeries–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 ANDMEANVALUETHEORMS
The derivability of a function at a point and and on an interval - Derivability and continuity of a function - MeanvalueTheorems -Rolle'sTheorem,Lagrange's Theorem, Cauchy's Mean value Theorem
Unit – 5 RIEMANNINTEGRATION
Riemann Integral - Riemann integral functions - Darboux theorem -Necessary and sufficientcondition for 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.
TextBook
An Introduction to Real Analysis by Robert G.Bartle and Donlad R. Sherbert, John Wiley and sonsPvt. Ltd

ReferenceBooks
1. ElementsofRealAnalysis by ShanthiNarayan andDr.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
*****

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.
- Learnapplicationsintermsoffindingsurfaceareabydoubleintegralandvolumebytripleintegral
- Determine the gradient, divergenceandcurlofavectorandvectoridentities.
- Evaluateline,surfaceandvolumeintegrals.
- understand relation between surface and volume integrals (Gauss divergence
- theorem), relationbetweenlineintegralandvolumeintegral(Green'stheorem),relationbetween lineandsurfaceintegral(Stokestheorem)

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 e involving the separators.

Unit–4 Vectori ntegration

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

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

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 Dirichilet's tests. Rearrangement of series, product of series.

<div align="center">Unit -5

Power series</div>

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 - $\text{Cos}^{-1} z$, $\text{Sin}^{-1} z$ and derivatives of $\text{Cos}^{-1} z$, $\text{Sin}^{-1} z$.

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 HallIndia Learning Private Limited

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DEPARTMENT OF PHYSICS

B.Sc-PHYSICS Syllabus
Semester-I
101PHY24: Physics -1: Mechanics, Waves & Oscillations

Learning outcomes:
➢ To understand basic theories related with properties of matter and its applications to determinevalues of various physical quantities associated with matter.
➢ Be able to apply knowledge of the properties of matter to explain natural physical processes andrelated technological advances.
➢ To learn about fundamentals of verbal and mathematical concepts of waves and oscillations
➢ We should make the students to know their skills required to get the information from the syllabusand use them in a proper way

UNIT I:
Mechanics of Particles: Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford Scattering-Derivation.
Mechanics of Rigid bodies: Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope, Precession of the equinoxes

UNIT II:
Motion in a Central Force Field: Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts

UNIT III:
Relativistic Mechanics: Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation.

UNIT IV:
Undamped, Damped and Forced oscillations: Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance, Logarithmic decrement, Relaxation time and Quality factor.
Coupled oscillations: Coupled oscillators - introduction, Two coupled oscillators, Normal coordinates and Normal Modes.

UNIT V:
Vibrating Strings: Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtones and Harmonics.
Ultrasonics: Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR

REFERENCE BOOKS:
1. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
3. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
4. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications,Delhi
5. Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
6. Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications.
7. Unified Physics - Waves and Oscillations, Jai PrakashNath&Co.Ltd.
8. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, OrientLongman.
9. The Physics of Waves and Oscillations, N.K.Bajaj, Tata McGraw Hill
10. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004

Semester-I
102PHY24: Physics -1 Practical: Mechanics, Waves & Oscillations Lab

Details of Lab/Practical/Experiments/Tutorials syllabus:
Minimum of 6 experiments to be done and recorded:

1. Young's modulus of the material of a bar (scale) by uniform bending

2. Young's modulus of the material a bar (scale) by non- uniform bending

3. Surface tension of a liquid by capillary rise method

4. Viscosity of liquid by the flow method (Poiseuille's method)

5. Bifilar suspension –Moment of inertia of a regular rectangular body.

6. Fly-wheel -Determination of moment of inertia

7. Rigidity modulus of material of a wire-Dynamic method (Torsional pendulum)

8. Volume resonator experiment

9. Determination of 'g' by compound/bar pendulum

10. Simple pendulum- normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
11. Determination of the force constant of a spring by static and dynamic method.

Semester-II
201PHY24: Physics-2: Wave Optics

Learning outcomes:
*   Understand the nature of light and principles of Laser and holography.
*   Analyze the intensity variation of light due to interference, diffraction and polarization.
*   Solve problems in Optics by selecting the appropriate equations and performing numerical oranalytical calculations.
*   Student can able to operation of optical devices including polarizers, interferometers, and Lasers.

UNIT I: Interference of light: (12hrs)
Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude, Phase change on reflection- Stokes' treatment, Lloyd's single mirror, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength.

UNIT II: Diffraction of light:(12hrs)

Introduction, Types of diffraction: Fresnel and Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction at a single slit, Plane diffraction grating, Determination of wavelength of light using diffraction grating, Resolving power of grating, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, comparison of zone plate with convex lens.

UNIT III: Polarisation of light:(12hrs)

Polarized light: Methods of production of plane polarized light, Double refraction, Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, Plane, Circularly and Elliptically polarized light-Production and detection, Optical activity, Laurent's half shade polarimeter: determination of specific rotation.

UNIT IV: Aberrations and Fibre Optics: (12hrs)

Monochromatic aberrations, Spherical aberration, Methods of minimizing spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance. **Fibre optics:** Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication.

UNIT V: Lasers and Holography:(12hrs)

Lasers: Introduction, Spontaneous emission, stimulated emission, Population Inversion, Laser principle, Einstein coefficients, Types of lasers-He-Ne laser, Ruby laser, Applications of lasers; Holography: Basic principle of holography, Applications of holography

REFERENCE BOOKS:
1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand & Co.
3. Optics-Murugeshan, S.Chand & Co.
4. Unified Physics Vol.II Optics, Jai Prakash Nath & Co.Ltd., Meerut
5. Optics, F.A. Jenkins and H.G.White, McGraw-Hill
6. Optics, Ajoy Ghatak, Tata McGraw-Hill.
7. Introduction of Lasers – Avadhanulu, S.Chand & Co.
8. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

B.Sc-PHYSICS Syllabus
Semester-II
202PHY24: Physics-2 Practical: Wave Optics Lab

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Determination of radius of curvature of a given convex lens-Newton's rings.

2. Resolving power of grating.

3. Study of optical rotation –polarimeter.

4. Dispersive power of a prism.

5. Determination of wavelength of light using diffraction grating-minimum deviation method.
6. Determination of wavelength of light using diffraction grating-normal incidence method.
7. Resolving power of a telescope.

8. Refractive index of a liquid-hallow prism

9. Determination of thickness of a thin wire by wedge method

10. Determination of refractive index of liquid-Boy's method.

11. Determination of Cauchy's constants (Using prism A and B).

B.Sc-PHYSICS Syllabus
Semester-III
301PHY24: Physics-3: Heat & Thermodynamics

Learning outcomes:
- Students will be able to Perform experiments and interpret the results of observation, includingmaking an assessment of experimental uncertainties.
- They develop the ability to apply the knowledge acquired in the classroom and laboratories tospecific problems in theoretical and experimental Physics.
- To apply the theories learnt and the skills acquired to solve real time problems
- To understand the concepts and significance of the various physical phenomena

UNIT I: Kinetic Theory of gases: (12 hrs)

Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities (qualitative treatment only) and its experimental verification, Mean free path, Degrees of freedom, Principle of equipartition of energy (Qualitative ideas only), Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases.

UNIT II: Thermodynamics: (12hrs)

Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature and its identity with perfect gas scale, Second law of thermodynamics: Kelvin's and Clausius statements, Principle of refrigeration, Entropy, Physical significance, Change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature- Entropy (T-S) diagram and its uses; change of entropy when ice changes into steam.

UNIT III: Thermodynamic Potentials and Maxwell's equations: (12hrs)

Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clapeyron's equation (ii) Value of CP-CV (iii)Value of CP/CV (iv) Joule-Kelvin coefficient for ideal gases.

UNIT IV: Low temperature Physics:(12hrs)

Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment, Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substances at low temperatures.

UNIT V: Quantum theory of radiation: (12 hrs)
Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh-Jean's law from Planck's law, Solar constant and its determination using Angstrom pyrheliometer, Estimation of surface temperature of Sun.

REFERENCE BOOKS:
1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. Thermodynamics, R.C.Srivastava, S.K.Saha &Abhay K.Jain, Eastern Economy Edition.
3. Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath & Co.Ltd., Meerut
4. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
5. Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012
6. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
7. University Physics, HD Young, MW Zemansky, FW Sears, Narosa Publishers, New Delhi

B.Sc-PHYSICS Syllabus
Semester-III
302PHY24: Physics-3 Practical: Heat & Thermodynamics Lab

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction

2. Thermal conductivity of bad conductor-Lee's method

3. Thermal conductivity of rubber.

4. Measurement of Stefan's constant.

5. Specific heat of a liquid by applying Newton's law of cooling correction.

6. Heating efficiency of electrical kettle with varying voltages.

7. Thermoemf- thermo couple - Potentiometer

8. Thermal behavior of an electric bulb (filament/torch light bulb)

9. Measurement of Stefan's constant- emissive method

10. Study of variation of resistance with temperature - Thermistor.

11. Calculation of temperature coefficient of given material using Carry Fosters bridge.

B.Sc-PHYSICS Syllabus
Semester-IV
401PHY24: Physics-4: Electricity, Magnetism & Electronics

Learning outcomes:
- To learn about Gauss law and solve the electric field and magnetic field for various geometric objects and to learn basic electronic concepts in analog and digital theory.
- To be Explain all the topics of Experiments, Concepts and Derivations to the student
- Apply the principles of electronics in day-to-day life.
- Encourage all the students to study higher educational courses in reputed institutes and to enrich the students with creative, logical and analytical skills and to motivate the students towards research side

UNIT I:

Electrostatics: (6hrs): Gauss's Law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Deduction of Coulomb's law from Gauss law, Electrical potential–Equipotential surfaces, Potential due to a uniformly charged sphere.

Dielectrics: (6 hrs): Dielectrics-Polar and Non-polar dielectrics- Effect of electric field on dielectrics, Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, Electric polarization P, Relation between D, E and P, Dielectric constant and electric susceptibility.

UNIT II:

Magnetostatics: (6 hrs): Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.

Electromagnetic Induction: (6 hrs): Faraday's laws of electromagnetic induction, Lenz's law, Self-induction and Mutual induction, Self-inductance of a long solenoid, Mutual inductance of two coils, Energy stored in magnetic field, Eddy currents.

UNIT III:

Alternating currents: (6 hrs): Alternating current - Relation between current and voltage in L,C, R, LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q – factor, Power factor.

Electromagnetic waves-Maxwell's equations:(6 hrs): Idea of displacement current, Maxwell's Equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement and proof). Velocity of wave equation using maxwells relations in vacuum.

UNIT IV:

Basic Electronic devices: (12 hrs): PN junction diode, Zener diode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristics of a transistor in CE mode, Relation between alpha, beta and gamma; Transistor as an amplifier.

UNIT-V:

Digital Electronics: (12 hrs): Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's Laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.

REFERENCE BOOKS
1. BSc Physics, Vol.3, Telugu Academy, Hyderabad.
2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
3. Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal & Co.
4. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand & Co.,

5. Electricity and Magnetism, R.Murugeshan, S. Chand & Co.
6. Principles of Electronics, V.K. Mehta, S.Chand & Co.,
7. Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGraw Hill Edition.

B.Sc-PHYSICS Syllabus

Semester-IV

402PHY24: Physics-4 Practical: Electricity, Magnetism & Electronics Lab

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvanometer.

2. LCR circuit series/parallel resonance, Q factor.

3. Determination of ac-frequency –Sonometer.

4. Verification of Kirchoff's laws and Maximum Power Transfer theorem.

5. Field along the axis of a circular coil carrying current-Stewart & Gee's apparatus.

6. PN Junction Diode Characteristics

7. Zener Diode –V-I Characteristics

8. Zener Diode as a voltage regulator

9. Transistor CE Characteristics- Determination of hybrid parameters

10. Logic Gates- OR, AND, NOT and NAND gates. Verification of Truth Tables.

11. Verification of De Morgan's Theorems.

12. Construction of Half adder and Full Adders-Verification of truth tables

13. Universal gates construction and verification of truth tables.

B.Sc-PHYSICS Syllabus
Semester-IV
403PHY24: Physics-5: Modern Physics

Learning outcomes:

- To Create awareness on the topics of Atomic & Molecular Physics, Quantum mechanics, NuclearPhysics, and Solid-state physics.
- To be Explain all the topics of Experiments, Concepts and Derivations to the student.
- Explain the basic principles of quantum mechanics and apply to Atomic, Molecular structure ofenergy levels etc.
- Motivate all the students to pursue PG courses in reputed institutes and to endow the students withcreative and analytical skills; this will equip them to become entrepreneurs.

UNIT I:

Atomic and Molecular Physics:(12 hrs): Vector atom model and Stern-Gerlach experiment, Quantum numbers associated with it, Angular momentum of the atom, Coupling schemes, Spectral terms and spectral notations, Selection rules, Intensity rules, Fine structure of Sodium D-lines, Zeeman effect, Experimental arrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect. Experimental arrangement to study Raman effect, Quantum theory of Raman effect, Applications of Raman effect.

UNIT II:

Matter waves &Uncertainty Principle:(12 hrs): Matter waves, de Broglie's hypothesis, Wave length of matter waves, Properties of matter waves, Davisson and Germer's experiment, Phase and group velocities, Heisenberg's uncertainty principle for position and momentum& energy and time, Illustration of uncertainty principle using diffraction of beam of electrons and photons (Gamma ray microscope), Bohr's principle of complementarity.

UNIT III:

Quantum (Wave) Mechanics:(12 hrs): Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height(Infinite Potential Well) and (ii) three dimensional box - tunneling effect.

UNIT IV:

Nuclear Physics:(12 hrs): Nuclear Structure: General Properties of Nuclei, Mass defect, Binding energy; Nuclear forces: Characteristics of nuclear forces- Yukawa's meson theory; Nuclear Models: Liquid drop model, The Shell model, Magic numbers; Nuclear Radiation detectors: G.M. Counter, Cloud chamber, Solid State detector; Elementary Particles: Elementary Particles and their classification.

UNIT-V:

Nano materials:(7hrs): Nanomaterials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene (Mention of structures and properties), Distinct properties of nano materials (Mention-mechanical, optical, electrical, and magnetic properties); Mention of applications of nano materials: (Fuel cells, Phosphors for HD TV).

Superconductivity: (5 hrs): Introduction to Superconductivity, Experimental results-critical temperature, critical magnetic field, Meissner effect, Isotope effect, Type I and Type II superconductors, BCS theory (elementary ideas only),Applications of superconductors.

REFERENCE BOOKS
1. BSc Physics, Vol.4, Telugu Academy, Hyderabad
2. Atomic Physics by J.B. Rajam; S.Chand & Co.,
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
4. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.

5. Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
6. S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publ.Co.)
7. K.K.Chattopadhyay & A.N.Banerjee, Introd.to Nanoscience and Technology(PHILearning Priv.Limited).
8. Nano materials, A K Bandopadhyay. New Age International Pvt Ltd (2007)
9. Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, Baldev Raj,BB Rathand J Murday-Universities Press-IIM

B.Sc-PHYSICS Syllabus
Semester-IV
404PHY24: Physics-5 Practical: Modern Physics Lab

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. e/m of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Determination of the Planck's constant using LEDs of at least 4 different colours.
5. Determination of work function of material of filament of directly heated vacuum diode.
6. Study of absorption of α-rays.
7. Study of absorption of β-rays.
8. Determination of Range of β-particles.
9. Determination of M & H.
10. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
11. Energy gap of a semiconductor using junction diode.
12. Energy gap of a semiconductor using thermistor
13. GM counter characteristics
14. Study of photo cell characteristics.

B.Sc-PHYSICS Syllabus
Semester-V
501PHY24: Physics-6: Low Temperature Physics & Refrigeration

Learning outcomes:
- Identify various methods and techniques used to produce low temperatures in the Laboratory.
- Acquire a critical knowledge on refrigeration and air conditioning.
- Demonstrate skills of Refrigerators through hands on experience and learns about refrigeration components and their accessories.
- Understand the classification, properties of refrigerants and their effects on environment.
- Comprehend the applications of Low Temperature Physics and refrigeration.

UNIT I: PRODUCTION OF LOW TEMPERATURE   (10 hrs)
Production of low temperatures-Introduction, Freezing mixtures, Joule-Thomson effect, Regenerative cooling, Different methods of liquefaction of gases, liquefaction of air, Production of liquid hydrogen and nitrogen, Adiabatic demagnetization, Properties of materials at low temperatures, Superconductivity

UNIT II: MEASUREMENT OF LOW TEMPERATURE   (10 hrs)
Gas thermometer and its correction and calibration, Secondary thermometers, resistance thermometers, thermocouples, Vapour pressure thermometers, Magnetic thermometers, Advantages and drawbacks of each type of thermometer.

UNIT III: PRINCIPLES OF REFRIGERATION   (10 hrs)
Introduction to Refrigeration- Natural and artificial refrigeration, Stages of refrigeration, Types of refrigeration - Vapor compression and vapor absorption refrigeration systems, Refrigeration cycle and explanation with a block diagram, Introductory ideas on air- conditioning.
Refrigerants-Introduction, Ideal refrigerant, Properties of refrigerant, Classification of refrigerants, commonly used refrigerants, Eco-friendly refrigerants

UNIT IV: COMPONENTS OF REFIGERATOR(10 hrs)
Refrigerator and its working, Block diagram, Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER), Refrigerator components: Types of compressors, evaporators and condensers and their functional aspects, defrosting in a refrigerator, Refrigerant leakage and detection

UNIT V: APPLICATIONS OF LOW TEMPERATURE & REFRIGERATION (10 hrs.)
Applications of Low temperatures: Preservation of biological material, Food freezing, liquid nitrogen and liquid hydrogen in medical field, Superconducting magnets in MRI- Tissue ablation (cryosurgery) - Cryogenic rocket propulsion system.
Applications of refrigeration: Domestic refrigerators, Water coolers, Cold storages, Ice plants, Food preservation methods, Chemical and Process industries, Cold treatment of metals, Construction field, Desalination of water, Data centres.

REFERENCE BOOKS:
1. Heat and Thermodynamics by Brij Lal & N.Subramanyam, S.Chand Publishers.
2. Thermal Physics by S C Garg, R M Bansal & C K Ghosh, McGraw Hill Education, India
3. Heat and Thermodynamics by M M Zemansky, McGraw Hill Education (India).
4. Low-Temperature Physics by Christian E. & Siegfried H., Springer.
5. Thermal Engineering by S. Singh, S.Pati, Ch:18 Introduction to Refrigeration.
6. The Physics Hyper Text Book. Refrigerators. https://physics.info/refrigerators/
7. Refrigeration and Air Conditioning by Manohar Prasad, New age international (P) limited, New Delhi
8. A course in Refrigeration and Air Conditioning by S.C. Arora and S. Domkundwar, Dhanpatrai and sons, Delhi

B.Sc-PHYSICS Syllabus
Semester-V
502PHY24: Physics-6 Practical: Low Temperature Physics & Refrigeration Lab

Practical (Laboratory) Syllabus: (30 hrs. Max marks: 50)

1. Record the Principles and applications of Refrigerators and Freezers.
2. Measure the temperatures below Melting point of Ice using a thermometer available in the Lab.
3. Make a freezing mixture by adding different salts viz., Sodium chloride, Potassium Hydrate (KOH), Calcium chloride to ice in different proportions and observe the temperature changes.
4. Study the operation of a refrigerator and understand the working of different parts.
5. Study the properties of refrigerants like chlorofluorocarbons-hydro chloro fluoro- carbons andrecord the lowest temperatures obtained.
6. Consider a simple faulty refrigerator and try to troubleshoot the simple problems by understanding it's working.
7. Understand the practical problem of filling the Freon Gas into the Refrigerator.
8. Get the Liquid Nitrogen or Liquid Helium from nearby Veterinary Hospital and measure their temperatures using chromel-alumel thermocouple or mercury thermometer and observe their physical properties like colour, smell etc and precautions to be taken for their safe handling.
9. Preparation of freeze-drying food with Dry ice and liquid nitrogen
10. Preparation of freeze-drying food with liquid nitrogen

B.Sc-PHYSICS Syllabus
Semester-V
503PHY24: Physics-7: Solar Energy & Applications

Learning outcomes:
- Understand Sun structure, forms of energy coming from the Sun and its measurement.
- Acquire a critical knowledge on the working of thermal and photovoltaic collectors.
- Demonstrate skills related to callus culture through hands on experience
- Understand testing procedures and fault analysis of thermal collectors and PV modules.
- Comprehend applications of thermal collectors and PV modules.

UNIT I: BASIC CONCEPTS OF SOLAR ENERGY   (10HRS)
Spectral distribution of solar radiation, Solar constant, zenith angle and Air-Mass, standard time, local apparent time, equation of time, direct, diffuse and total radiations. Pyrheliometer - working principle, direct radiation measurement, Pyrometer-working Principle, diffuse radiation measurement, Distinction between the two meters.

UNIT II: SOLAR THERMAL COLLECTORS   (10hrs)
Solar Thermal Collectors-Introduction, Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance equation and efficiency, Evacuated tube collector, collector overall heat loss coefficient, Definitions of collector efficiency factor, collector heat-removal factor and collector flow factor, Testing of flat-plate collector, solar water heating system, natural and forced circulation types. Concentrating collectors, Solar cookers, Solar dryers, Solar desalinators.

UNIT III: FUNDAMENTALS OF SOLAR CELLS   (10Hrs)
Semiconductor interface, Types, homo junction, hetero junction and Schottky barrier, advantages and drawbacks, Photovoltaic cell, equivalent circuit, output parameters, conversion efficiency, quantum efficiency, Measurement of I-V characteristics, series and shunt resistance, their effect on efficiency, Effect of light intensity, inclination and temperature on efficiency

UNIT IV: TYPES OF SOLARCELLS AND MODULES   (10 hrs)
Types of solar cells, Crystalline silicon solar cells, I-V characteristics, poly-Si cells, Amorphous silicon cells, Thin film solar cells-CdTe/CdS and CuInGaSe2/CdS cell configurations, structures, advantages and limitations, Multi junction cells – Double and triple junction cells. Module fabrication steps, Modules in series and parallel, Bypass and blocking diodes

UNIT V: SOLAR PHOTOVOLTAIC SYSTEMS(10hrs)
Energy storage in PV systems, Energy storage modes, electrochemical storage, Batteries, Primary and secondary, Solid-state battery, Molten solvent battery, lead acid battery and dry batteries, Mechanical storage – Flywheel, Electrical storage – Super capacitor

REFERENCES BOOKS:
1. Solar Energy Utilization by G. D. Rai, Khanna Publishers
2. Solar Energy- Fundamentals, design, modelling and applications by G.N. Tiwari, NarosaPublications, 2005.
3. Solar Energy-Principles of thermal energy collection & storage by S.P. Sukhatme, TataMc-Graw Hill Publishers, 1999.
4. Science and Technology of Photovoltaics, P. Jayarama Reddy, CRC Press (Taylor &Francis Group), Leiden &BS Publications, Hyderabad, 2009.
5. Solar Photovoltaics- Fundamentals, technologies and applications, Chetan SinghSolanki, PHI Learning Pvt. Ltd.,

B.Sc-PHYSICS Syllabus
Semester-V
504PHY24: Physics-7 Practical: Solar Energy & Applications Lab

Practical (Laboratory) Syllabus:

1. Measurement of direct radiation using pyrheliometer.
2. Measurement of global and diffuse radiation using pyranometer.
3. Evaluation of performance of a flat plate collector
4. Evaluation of solar cell / module efficiency by studying the I – V measurements.
5. Determination of series and shunt resistance of a solar cell / module.
6. Determination of efficiency of two solar cells / modules connected in series.
7. Determination of efficiency of two solar cells / modules connected in parallel.
8. Study the effect of input intensity on the performance of solar cell / module.
9. Study the influence of cell / module temperature on the efficiency.
10. Study the effect of cell / module inclination on the efficiency.

B.SC- CHEMISTRY SYLLABUS

I YEAR- 1 SEMESTER

101CHE24: CHEMISTRY-1: GENERAL AND INORGANIC CHEMISTRY

Course Outcomes:

At the end of the course the student will be able to-

- Understand the structure of atom and the arrangement of elements in the periodic table.
- Understand the nature and properties of ionic compounds.
- Identify the structure of a given inorganic compound.
- Explain the existence of special types of compounds through weak chemical forces.
- Define acids and bases and predict the nature of salts.

Unit I: Atomic Structure and Periodic table (9 h)

Electronic configuration: Bohr theory, duel nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, normalization of wave function, radial and angular wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Aufbau principle).
Periodicity: periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number, horizontal, vertical, and diagonal relationships in the periodic table. 1.3 General properties of atoms: size of atoms and ions-atomic radii, ionic radii, covalent radii; trend in ionic radii, ionization potential, electron affinity; electronegativity - Pauling, Mulliken-Jaffe, Allred-Rochow definitions; oxidation states and variable valency; isoelectronic relationship; inert-pair effect;

UNIT 2: Ionic bond (9 h)

Properties of ionic compounds, factors favouring the formation of ionic compounds- ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation of ionic compound and stability. Stability of ionic compounds in terms of ΔH_f and U_o. Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds-polarization and Fajan's rules; effects of polarization-solubility, melting points, and thermal stability of typical ionic compounds.

UNIT 3: The Covalent Bond (9 h)

Valance Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules-$BeCl_2$, BF_3, CH_4, PCl_5, SF_6– VSEPR model-effect of bonding and nonbonding electrons on the structure of molecules, effect of electronegativity, isoelectronic principle, illustration of structures by VESPR model-NH_3, H_2O, SF_4, ICl^-_4
ICl^-_2 XeF_4, XeF_6
Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N_2, O_2, CO and NO)

UNIT 4: Metallic and Weak Bonds (9 h)

The Metallic bond: metallic properties, free electron theory, Valence Bond Theory, band theory of metals. Explanation of conductors, semiconductors and insulators.
Weak bonds: hydrogen bonding-intra- and intermolecular hydrogen bonding, influence on the physical properties of molecules, comparison of hydrogen bond strength and properties of hydrogen bonded N, O and F compounds; associated molecules-ethanol and acetic acid; Vanderwaals forces, ion dipole-dipole interactions.

UNIT 5: Acids and Bases (9 h)

Theories of acids and bases: Arrhenius theory, Bronsted-Lowry theory, Lewis theory, the solvent system,

Nonaqueous solvents: classification-protonic and aprotic solvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia.

Types of chemical reactions: acid-base, oxidation-reduction, calculation of oxidation number. Definition of pH, pK_a, pK_b. Types of salts, Salt hydrolysis. Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard andSoft-Soft combinations.

List of Reference Books:

1. J. D. Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.
2. . B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., 1996.
3. D. F. Shriver and P. W. Atkins, Inorganic Chemistry, 3rd ed., W. H. Freeman and Co, London,

102CHE24: CHEMISTRY-1 PRACTICAL: GENERAL AND INORGANIC CHEMISTRY

Practical- I Qualitative Analysis of SIMPLE SALT

Qualitative inorganic analysis (Minimum of Six simple salts should be analysed) 50 M

Course outcomes:
- At the end of the course, the student will be able to;
- Understand the basic concepts of qualitative analysis of inorganic simple salt.
- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

Laboratory course syllabus: Analysis of SIMPLE SALT

Analysis of simple salt containing ONE anion and ONE cation from the following:
Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.
Cations: Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Magnesium and Ammonium.

Co-curricular activities and Assessment Methods
- Continuous Evaluation: Monitoring the progress of student's learning.
- Class Tests, Work sheets and Quizzes
- Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
- SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

Reference books:

I. Vogel's Qualitative Inorganic Analysis, Seventh edition, Pearson.

<div align="center">**B.SC- CHEMISTRY SYLLABUS**</div>

<div align="center">**I YEAR- 2 SEMESTER**</div>

<div align="center">**201CHE24: CHEMISTRY-2: FUNDAMENTALS IN ORGANIC CHEMISTRY**</div>

Course outcomes:

At the end of SEMESTER the student will be able to

- Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.
- Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
- Learn and identify many organic reaction mechanisms .
- Correlate and describe the stereo-chemical properties of organic compounds and reactions.

Unit 1. Structural theory in Organic Chemistry (9 h)

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents). Reaction intermediates – Carbocations, carbanions & free radicals. Bond polarization: Factors influencing the polarization of covalent bonds, inductive effect - Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes.

Unit II Saturated Hydrocarbons (Alkanes and Cycloalkanes) 9 h

General methods of preparation of alkanes- Wurtz and Wurtz Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).

General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of monosubstituted cyclohexane.

UNIT-III Unsaturated Hydrocarbons (Alkenes and Alkynes) 9 h

General methods of preparation, physical and chemical properties, Saytzeff and Hoffmann eliminations (with mechanism), Electrophilic Additions, (H_2, HX) mechanism (Markownikoff/ Antimarkownikoff addition) with suitable examples-syn and anti-addition;

addition of X_2, HX. Oxymercuration demercuration, ozonolysis, hydroxylation, Diels Alder reaction, 1,2- and1,4-addition reactions in conjugated dienes. Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.

UNIT-IV Benzene and its reactivity (9 h)

Structure of Benzene – Preparation - polymerisation of acetylene and decarboxylation- Properties - mechanism of electrophilic aromatic substitution of Friedel- Craft's alkylation and acylation. halogenation and nitration,

UNIT-V Orientation of aromatic substitution   (9 h)

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropylium cation) Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO_2 and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens.

II.   List of Reference Books

1.   Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).
2.   Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3.   Guide book to Mechanism in Organic Chemistry by Peter Sykes 6th edition,1985.

202CHE24: CHEMISTRY-2 PRACTICAL: FUNDAMENTALS IN ORGANIC CHEMISTRY

Course Outcomes:

At the end of the course, the student will be able to;

- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- Determine melting and boiling points of organic compounds
- Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

Syllabus:

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives. Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

Co-curricular activities and Assessment Methods

- Continuous Evaluation: Monitoring the progress of student's learning
- Class Tests, Worksheets and Quizzes
- Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
- SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

Reference books:

1. Vogel A.I .Practical Organic Chemistry, Longman Group Ltd.
2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
3. Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press.

B.SC- CHEMISTRY SYLLABUS

II YEAR- 3 SEMESTER

301CHE24: CHEMISTRY-3: PHYSICAL CHEMISTRY- II (STATES OF MATTER, PHASE RULE & SURFACE CHEMISTRY)

Course outcomes:
At the end of the semester the student will be able to:
- Explain the difference between solids liquids and gases in terms of intermolecular interactions.
- Differentiate ideal and real gases.
- Discuss the basic concepts of two component systems
- Apply the concepts of adsorption.
- Understand the basic concepts of crystallography.

Unit I - Gaseous state (9 h)

Postulates of Kinetic theory of Gases (exclude derivation) – deduction of gas laws from kinetic gas equation-Vander Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. Relationship between critical constants and vander Waal's constants. Law of corresponding states. Joule- Thomson effect. Inversion temperature.

Unit II – Liquid State (9 h)

Physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water.
Liquid crystals, mesomorphic state. Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices

UNIT-III - Solid state (9h)

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. Miller indices, Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law and its derivation. Powder method. Defects in crystals. Stoichiometric and non-stoichiometric defects.

Unit IV - Phase Rule (9 h)

The Concept of phase, components, degrees of freedom. Gibbs phase rule. Phase diagram of one component system – water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point, freezing mixtures

Unit V Surface Chemistry (9 h)

Definition and classification of Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number.
Adsorption - Physical and chemical adsorption, Freundlich and Langmuir adsorption isotherm, applications of adsorption.

List of Reference Books:

1. **Solid State Chemistry and its applications by Anthony R. West**
2. **Text book of physical chemistry by K L Kapoor Vol.1**
3. **Text book of physical chemistry by S Glasstone**
4. **Advanced physical chemistry by Bahl and Tuli.**

302CHE24: CHEMISTRY-3 PRACTICAL: PHYSICAL CHEMISTRY- II (STATES OF MATTER, PHASE RULE & SURFACE CHEMISTRY)

Course outcomes:

At the end of the course, the student will be able to:
1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Apply concepts of surface chemistry in experiments.
3. Be familiar with the concepts & practical applications of Surface tension and viscosity of liquids.

Physical Chemistry Practical Syllabus:

1. Determination of surface tension of liquid by drop count method
2. Determination of surface tension of liquid by drop weight method
3. Determination of surface tension of mixture (liquid + detergent) using stalagmometer.
4. Determination of coefficient of viscosity of an organic liquid.
5. Determination of composition of a glycerol in glycerol + water mixture using viscometer.
6. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.

Co-curricular activities and Assessment Methods:
- Continuous Evaluation: Monitoring the progress of student's learning
- Class Tests, Worksheets and Quizzes
- Presentations, Projects and Assignments and Group Discussions: Enhances

Critical thinking skills and personality
1. Semester -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester .

List of reference books:
1. A Text Book of Quantitative Inorganic Analysis(3rdEdition) –A.I.Vogel
2. Web related references suggested by teacher.

B.SC- CHEMISTRY SYLLABUS

II YEAR- 4 SEMESTER

401CHE24: CHEMISTRY-4: GENERAL AND PHYSICAL CHEMISTRY

Course outcomes:
At the end of the semester the student will be able to:
- Correlate and describe the stereochemical properties of organic compounds.
- Explain the biological significance of various elements present in the human body.
- Apply the concepts of ionic equilibrium for the qualitative and quantitative analysis.
- Determine the order of a chemical reaction.
- Describe the basic concepts of enzyme catalysis.

UNIT-I Stereo chemistry of carbon compounds

Molecular representations - Wedge, Fischer, Newman and Saw-Horse formulae.
Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation. Chiral molecules- definition and criteria (Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

Unit II Bioinorganic Chemistry

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Na / K- pump, carbonic anhydrase and carboxy peptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cisplatin as an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin-transfer of oxygen, Myoglobin-Storage and transfer of iron

Unit III Ionic equilibrium

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, Buffer solutions-Henderson's equation. Indicators-theories of acid – base Indicators, selection of Indicators, Common ion effect Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Unit IV Chemical Kinetics-I:

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (similar and different reactants). Half–life of a reaction. General methods for determination of order of a reaction.

Unit V Chemical Kinetics-II:
Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).
Enzyme catalysis- Specificity, factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaels- Menten equation- derivation, significance of Michaelis-Menten constant.

Reference books

1. Text book of physical chemistry by S Glasstone
2. Concise Inorganic Chemistry by J.D.Lee
3. Advanced physical chemistry by Gurudeep Raj

4. Advanced physical chemistry by Bahl and Tuli
5. Inorganic Chemistry by J.E.Huheey
6. Basic Inorganic Chemistry by Cotton and Wilkinson.

402CHE24: CHEMISTRY-4 PRACTICAL: GENERAL AND PHYSICAL CHEMISTRY

Course outcomes:

At the end of the course, the student will be able to;

- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria
- Learn and identify the concepts of a standard solutions, primary and secondary standards
- Facilitate the learner to make solutions of various molar concentrations.

Syllabus:

Volumetric analysis:

1. Estimation of sodium hydroxide using standardised HCl solution.
2. Estimation of sodium carbonate and sodium hydroxide present in a mixture.
3. Determination of Fe (II) using $KMnO_4$ with oxalic acid as primary standard. (internal indicator method)
4. Determination of Fe (II) using $KMnO_4$ with oxalic acid as primary standard. (external indicator method)
5. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$

Co-curricular activities and assessment methods :

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
4. Semester -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester .

List of reference books:

1. A Text Book of Quantitative Inorganic Analysis(3rdEdition) –A.I.Vogel
2. Web related references suggested by teacher.

B.SC- CHEMISTRY SYLLABUS

II YEAR- 4 SEMESTER

403CHE24: CHEMISTRY-5: ANALYTICAL METHODS IN CHEMISTRY- QUANTITATIVE ANALYSIS

Learning Outcomes:
Students after successful completion of the course will be able to:
- Identify the importance of solvent extraction and ion exchange method.
- Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
- Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
- Understand the theories of different types of titrations.
- Gain knowledge on different types of errors and the minimization methods.

Unit-1: Quantitative analysis-1

A brief introduction to analytical methods in chemistry. Principles of volumetric analysis, concentration terms- Molarity, Molality, Normality,v/v, w/v, ppm and ppb, preparing solutions- Standard solution, primary standards and secondary standards.. Description and use of common laboratory apparatus- volumetric flask, burette, pipette, beakers, measuring cylinders.

Unit-2: Quantitative analysis-2

Principles of volumetric analysis: Theories of acid-base (including study of acid-base titration curves), redox, complex metric, iodometric and precipitation titrations-choice of indicators for the saturations. Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, post precipitation, digestion, filtration, and washing of precipitate, drying and ignition.

Unit-3: Treatment of analytical data

Types of errors- Relative and absolute, significant figures and its importance, accuracy - methods of expressing accuracy, errors- Determinate and indeterminate and minimization of errors, precision-methods of expressing precision, standard deviation and confidence interval.

Unit-4: Separation techniques

Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, Continuous extraction and counter current extraction. Synergism. Application-Determination of Iron(III). Ion Exchange method: Introduction, action of ion exchange resins, applications.

UNIT-5: Analysis of water

Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, COD, determination of chloride using Mohr's method.

Suggested Co-Curricular Activities:
1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz(on related topics).
3. Visits to laboratories, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

List of Reference Books:
1. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, DonaldM.West and Douglas A. Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and KevinA. Schug, Seventh

edition, Wiley.
3. Quantitative analysis by R.A.DayJr.and A.L.Underwood, Sixth edition, Pearson.
4. Text book of Vogel's Quantitative Chemical Analysis,Sixth edition, Pearson.
5. Text book of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & Co Ltd.

404CHE24: CHEMISTRY-5 PRACTICAL: ANALYTICAL METHODS IN CHEMISTRY- QUANTITATIVE ANALYSIS

Learning Outcomes:
On successful completion of this practical course, student shall be able to:
- Estimate Iron(II)using standard Potassium dichromate solution
- Learn the procedure for the estimation of total hardness of water
- Demonstrate the determination of chloride using Mohr's method
- Acquire skills in the operation and calibration of pH meter
- Perform the strong acid vs strong base titration using pH meter

Laboratory course Syllabus:
1. Estimation of Iron(II)using standard Potassium dichromate solution (using DPA indicator)
2. Estimation of total hardness of water using EDTA
3. Determination of chloride ion by Mohr's method
4. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
5. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride-ammonium hydroxide.
6. pH metric titration of (i) strong acid vs strong base,(ii)weak acid vs. Strong base.
7. Determination of dissociation constant of a weak acid.

Co-Curricular Activities:

Mandatory:*(Lab /field training of students by teacher:(lab:10+field:05):*

1. **For Teacher**: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques / skills of calibration of pH meter, Strong acid vs strong base titration using pH meter, determination of chloride ion, estimation of water quality parameters and estimation of Iron(II).
2. **For Student**: Student shall visit a related industry / chemistry laboratory in universities / research organizations/private sector facility and observe various methods used for the analysis of water. Write their observations and submit a hand written fieldwork /project work report not exceeding10pages in the given format to the teacher.
3. Max marks for Field work / projectwork Report:05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*
5. Unit tests (IE).

List of Reference books:
1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

B.SC- CHEMISTRY SYLLABUS

III YEAR- 5 SEMESTER

501CHE24: Chemistry-6: CHROMATOGRAPHY AND INSTRUMENTAL METHODS OF ANALYSIS

Learning Outcomes:

- Students after successful completion of the course will be able to:
- Identify the importance of chromatography in the separation and identification of compounds in a mixture
- Acquire a critical knowledge on various chromatographic techniques.
- Demonstrate skills related to analysis of water using different techniques.
- Understand the principles of spectrochemistry in the determination of metal ions.
- Comprehend the applications of atomic spectroscopy.

Unit-1: Chromatography-Introduction and classification

Principle, Classification of chromatographic methods, Nature of adsorbents, eluents, $R_f$values, factors affecting $R_f$values.

UNIT-2: TLC and paper chromatography

Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbents and solvents, development of chromatogram, detection of spots, applications and advantages.
Paper Chromatography: Principle, Experimental procedure, choice of paper and solvents, various modes of development- ascending, descending, radial and two dimensional, applications.

UNIT-3: Column chromatography

Column chromatography: Principle, classification, Experimental procedure, stationary and mobile phases, development of the Chromatogram, applications.
HPLC: Basic principles, instrumentation–block diagram and applications.

UNIT-4: Spectrophotometry

Principle, Instrumentation : Single beam and double beam spectrometer, Beer-Lambert's law- Derivation and deviations from Beer-Lambert's law, applications of Beer-Lambert's law- Quantitative determination of Fe^{+2}, $Mn^{+2}$and Pb^{+2}.

UNIT-5: Polarimetry and Refractometry

Polarimetry and Refractometry: Polarimetry: Nature of polarized light, polarimeter, sample cells, operation of the polarimeter, optical purity. Refractometry; The refractive index, Refractometer.

Suggested Co-Curricular Activities:
- Training of students by related industrial experts.
- Assignments, Seminars and Quiz(on related topics).
- Visits to laboratories, firms, research organizations etc.
- Invited lectures and presentations on related topics by field/industrial experts

List of Reference books:
1. Fundamental so Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.West and Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug,

Seventh edition, Wiley.
3. Quantitative analysis byR.A.DayJr .and A.L.Underwood,Sixth edition,Pearson.
4. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition/Pearson.
5. Instrumental methods of Chemical Analysis by Dr.B.K.Sharma 1981

502CHE24: Chemistry-6 Practical: CHROMATOGRAPHY AND INSTRUMENTAL METHODS OF ANALYSIS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:
- Perform the separation of a given dye mixture using TLC
- Learn the preparation of TLC plates
- Demonstrate the separation of mixture of amino acids using paper chromatography
- Acquire skills in using column chromatography for the separation of dye mixture.

Laboratory course Syllabus:
1. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
2. Separation of mixture of methyl orange and methylene blue by column chromatography.
3. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
4. Separation of food dyes using Column Chromatography
5. Separation of triglycerides using TLC
6. Verification of Beer lambert's law. (Using potassium permanganate solution) using colorimeter / spectrophotometer.

List of Reference books:
1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
2. VogelA.I .Practical Organic Chemistry, Longman Group Ltd.
3. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
4. Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press.

B.SC- CHEMISTRY SYLLABUS

III YEAR- 5 SEMESTER

503CHE24: CHEMISTRY-7: SYNTHETIC ORGANIC CHEMISTRY

Learning Outcomes:

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

- Identify the importance of reagents used in the synthesis of organic compounds.
- Acquire knowledge on basic concepts in different types of pericyclic reactions.
- Understand the importance of retro synthesis inorganic chemistry.
- Comprehend the applications of different reactions in synthetic organic chemistry.

Unit-1:Pericyclic reactions

Definition and classification of pericyclic reactions: Phases, nodes and symmetry propertiesof molecular orbital's in ethylene,1,3-butadiene,1,3,5-hexatriene,alkylationandallylradical. Thermal and photochemical reactions. Electro cyclic reactions: Definition and examples, definitions of con and disrotation,Woodward-Hoffmann selection rules.(Correlation diagrams excluded) Cyclo addition reactions: Definition and examples, definitions of supra facial and antar facial addition, Woodward- Hoffmann selection rules. (Correlation diagrams excluded)

Unit-2 : Organic photochemistry

Jablonski diagram-singlet and triplet States Photochemistry of Carbonyl compounds $n-\pi*$ and $\pi-\pi*$transitions, Norrish type-1and type-2reactions Paterno–Buchi reaction.

Unit-3 : Retrosynthesis

Important terms in Retro synthesis with examples-Disconnection, Target molecule, FGI, Synthon, Retrosynthetic analysis, chemo selectivity, region selectivity. Importance of Orderof events in organic synthesis. Retrosynthetic analysis of the compounds:a)cyclohexene b)4-Nitro toluene c) Paracetamol.

Unit-4 : Synthetic Reactions

Shapiro reaction, Stork - enamine reaction(only alkylation),Wittig reaction, Robinson annulation, Bailys-Hillman reaction, Heck reaction, Suzuki coupling. Synthesis of aldehydes and ketones using1, 3-Dithiane.

Unit-5 : Reagents in Organic Chemistry

Oxidizing agents:PCC,PDC,SeO2 (Riley oxidation), NBS.
Reducing agents : LiAlH4(with mechanism), LTBA, Metal-solvent reduction (Birchreduction), Catalytic reduction.

List of Reference books:
1. Pericyclic reactions by Ian Fleming, Second edition,Oxford University press.
2. Pericyclic Reactions- A Text book: Reactions, Applications and Theory byS.Sankararaman, WILEY-VCH.
3. Reaction Mechanism in Organic Chemistry by S.M. Mukherji and S.P.Singh, Revisededition, Trinity Press.
4. Pericyclic reactions – A Mechanistic study by S.M.Mukherji, Macmillan India.
5. Organic synthesis :The disconnection approach by Stuart Warren, John Wiley&Sons.
6. Organic chemistry by Jonathan Clayden, Nick Greeves and Stuart Warren, Secondedition,

Oxford university press.
7. Reactions, Reagents and Rearrangements by S.N. Sanyal, Bharati Bhawan Publishers &Distributors

504CHE24: CHEMISTRY-7 PRACTICAL: SYNTHETIC ORGANIC CHEMISTRY

Learning Outcomes:

On successful completion of this practical course, student shall be able to:
- Perform the organic qualitative analysis for the detection of N, S and halogens usingthe green procedure.
- Learn the procedure for the separation of mixture famine acids using paper Chromatography.
- Prepare the TLC plates for TL chromatography.
- Acquire skills in conducting column chromatography for the separation of dyes in thegiven mixture.

Laboratory course syllabus:
1. Green procedure for organic qualitative analysis: Detection of N,S and halogens
2. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
3. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
4. Separation of mixture of methyl orange and methylene blue by columnchromatography
5. Separation of food dyes using Column Chromatography
6. Separation of triglycerides using TLC

List of Reference books :
1. VogelA.I.Practical Organic Chemistry, Longman Group Ltd.
2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
3. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
4. MannF.G and Saunders B.C, Practical Organic Chemistry, Pearson Education.

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 Managemnet Sysyem (LMS) is customized to every student. For every student customized examination management system (EMS) is also created facilitationg 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 Statuatory boards in Distance mode also.

• **Admission procedure:** In Bachelor of Sciences Maths, Physics, Chemistry,   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 os 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 % indivually 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, Physics, Chemistry, program is based on the theory and practical papers. Laboratory support is available to students. Further, entire University Library is accessble to all the students of distance education. Additionally every department in the University has a well equipped library which is accessable 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.

DIRECTOR
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Acharya Nagarjuna University
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