ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

(A Statutory body of the Government of Andhra Pradesh)

3rd,4th and 5th floors, Neeladri Towers, Sri Ram Nagar, 6th Battalion Road,
Atmakur (V), Mangalagiri (M), Guntur-522 503, Andhra Pradesh
Web: www.apsche.org **Email**: acapsche@gmail.com

REVISED SYLLABUS OF ENGLISH under (Part – I)

UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21

PROGRAMME: THREE-YEAR B.A. /B.Sc./B.Com/BCA/BBM/BHM & CT, etc.

Andhra Pradesh State Council of Higher Education, Mangalagiri, Guntur District

Revised English Syllabus from 2020-21 Onwards

Under Choice Based Credit System

Introduction

The turn of the twenty first century has made the English Language skills a passport to the job market to all job seekers. Ability to communicate well in English has become a hallmark of good educational foundation and a prerequisite for all graduates. The students are expected to possess a measurable knowledge and a set of skills in using English language in personal and professional life. The present course **English Praxis** in three parts offers suitable context to teach, learn and practise target language skills. Each part of the course aims at certain specified skills which are taught through various text-based classroom activities and the English Language Laboratory activities. The syllabus of the course offers an open platform to the teacher to facilitate active participatory learning to the students. Hence the whole course is offered in three semesters. The first part of the course offers fundamentals of the English language in five units: Listening, Speaking, Grammar, Writing and Soft Skills. These introductory units are developed into full length courses in the subsequent semesters in addition to Reading Skills so as to prepare the learner into a fully equipped individual.

In addition to the classroom interaction, the course also aims at language enhancement through various ICT based online and offline activities in the English Language Laboratory. Each Unit is reinforced with Laboratory activities. The College administration will bestow special attention to make the **English Praxis** course an activity oriented one. The innovative methods and creativity of the English faculty will enhance the learners' participation in teaching and learning.

Semester-I English Praxis Course-I : **A Course in Communication and Soft Skills**

Semester-II English Praxis Course -II : **A Course in Reading & Writing Skills**

Semester-III English Praxis Course -III**: A Course in Conversational Skills**

English Syllabus-Semester-I

English Praxis Course-I

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

English Syllabus-Semester-II

English Praxis Course-II

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	

English Syllabus-Semester-III

English Praxis Course-III

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	

SUBJECT EXPERTS

Prof. K.Ratna Shiela Mani,
Department of English,
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Principal,
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SYLLABUS VETTED BY

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REVISED SYLLABUS OF TELUGU under (Part – I)

UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

PROGRAMME: THREE-YEAR B.A. /B.Sc./B.Com/BCA/BBM/BHM & CT

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Q.P.)

For Fifteen Courses of 1, 2, 3 Semesters)

(To be Implemented from 2020-21 Academic Year)

TELUGU

Andhra Pradesh State Council of Higher Education
B.A., B.Com., & B.Sc., etc., Programmes

Revised Syllabus under CBCS Pattern
w.e.f. 2020-21

Language Subjects - TELUGU
Revised Syllabus of
GENERAL TELUGU

ఆంధ్ర ప్రదేశ్ రాష్ట్ర ఉన్నత విద్యామండలి

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

సి.బి.సి.ఎస్.పద్ధతిలో సవరించబడిన పాఠ్యప్రణాళిక

2020-21 విద్యా సంవత్సరం నుంచి

జనరల్ తెలుగు – పాఠ్య ప్రణాళిక

Subject Curricular Framework

Sem	Course	Title	Hrs/Wk	Credits	Max. Marks IA	SE	Total
I	I	Pracheena Telugu Kavithvam	04	03	25	75	100
II	II	Aadhunika Telugu Sahithyam	04	03	25	75	100
III	III	Srujanaathmaka Rachana	04	03	25	75	100

పాఠ్యప్రణాళిక (3 కోర్సులు)

సెమి.	కోర్సు	శీర్షిక	పీరియడ్లు/వారానికి	క్రెడిట్లు	మొత్తం మార్కులు
I	I	ప్రాచీన తెలుగు కవిత్వం	04	03	25 75 100
II	II	ఆధునిక తెలుగు సాహిత్యం	04	03	25 75 100
III	III	సృజనాత్మక రచన	04	03	25 75 100

బి.ఏ., బి.కాం., బి.యస్‌సి., తదితర ప్రోగ్రాములు

అంశం: జనరల్ తెలుగు సెమిస్టర్-1

కోర్సు-1 : ప్రాచీన తెలుగు కవిత్వం

యూనిట్ల సంఖ్య:5 పీరియడ్ల సంఖ్య:60

✦ **అభ్యసన ఫలితాలు:-**

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. ప్రాచీన తెలుగుసాహిత్యం యొక్క ప్రాచీనతను, విశిష్టతను గుర్తిస్తారు. తెలుగుసాహిత్యంలో 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 మెళకువలను గ్రహించగలరు.

పాఠ్య ప్రణాళిక

యూనిట్–I

రాజనీతి – నన్నయ

మహాభారతం–సభాపర్వం–ప్రథమాశ్వాసం–(26–57 పద్యాలు)

యూనిట్–II

దక్షయజ్ఞం – నన్నెచోడుడు

కుమారసంభవం–ద్వితీయాశ్వాసం–(49–86 పద్యాలు)

యూనిట్–III

ధౌమ్య ధర్మోపదేశము – తిక్కన

మహాభారతం–విరాటపర్వం–ప్రథమాశ్వాసం–(116–146) పద్యాలు

యూనిట్–IV

పలనాటి 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, ద్రుతప్రకృతిక, నుగాగమ,ద్విరుక్తటకారాదేశ, యణాదేశ, వృద్ధి, శ్చుత్వ, జశ్త్వ, అనునాసిక సంధులు.

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

అలంకారాలుః

అర్థాలంకారాలు ः ఉపమ, ఉత్ప్రేక్ష, రూపక, స్వభావోక్తి, అర్థాంతరవ్యాస, 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. చారిత్రిక, 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.

ప్రశ్నాపత్ర నమూనా

అ. ప్రతిపదార్థ పద్యాలు–(అంతర్గత ఛాయిస్)	(2–1)	1×8=8 మా
ఆ. కంఠస్థ పద్యం–(అంతర్గత ఛాయిస్)	(2–1)	1×3=3 మా
ఇ. సందర్భ వాక్యాలు–	(6–4)	4×3=12 మా
ఈ. సంగ్రహ సమాధాన ప్రశ్నలు	(6–4)	4×3=12 మా
ఉ. వ్యాస ప్రశ్నలు (అంతర్గత ఛాయిస్)	(6–3)	3×8=24 మా
ఊ. వ్యాకరణం–సంధులు	(6–4)	4×1=4 మా
సమాసాలు	(6–4)	4×1=4 మా
అలంకారాలు	(2–1)	1×4=4 మా
ఛందస్సు	(2–1)	1×4=4 మా

బి.ఏ., బి.కాం., బి.యస్‌సి., తదితర ప్రోగ్రాములు

అంశం: జనరల్ తెలుగు సెమిస్టర్–2

కోర్సు–2 : ఆధునిక తెలుగు సాహిత్యం

యూనిట్ల సంఖ్య:5 **పీరియడ్ల సంఖ్య:60**

✦ **అభ్యసన ఫలితాలు:-**

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. ఆంగ్లభాష ప్రభావం కారణంగా తెలుగులో వచ్చిన ఆధునిక సాహిత్యాన్ని, దాని విశిష్టతను గుర్తిస్తారు.

2. సమకాలీన ఆధునిక సాహిత్య ప్రక్రియలైన "వచన కవిత్వం, కథ, నవల, నాటకం, విమర్శ"లపై అవగాహన పొందుతారు.

3. భావకవిత, అభ్యుదయ కవితాలక్ష్యాలను గూర్చిన జ్ఞానాన్ని పొందుతారు.అస్తిత్వవాద ఉద్యమాలపుట్టుకను, ఆవశ్యకతను గుర్తిస్తారు.

4. కథాసాహిత్యం ద్వారా సామాజిక చైతన్యాన్ని పొందుతారు. సిద్ధాంతాల ద్వారా కాకుండా, వాస్తవ పరిస్థితులను తెలుసుకోవడం ద్వారా సిద్ధాంతాన్ని సమీక్షించగలరు.

5. ఆధునిక తెలుగు కల్పనాసాహిత్యం ద్వారా సామాజిక, సాంస్కృతిక,రాజకీయ చైతన్యాన్ని పొందుతారు.

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

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.

✦ప్రశ్నాపత్ర నమూనా ✦

అ–విభాగము

సంక్షిప్త సమాధాన ప్రశ్నలు – ప్రతి యూనిట్ నుంచి తప్పనిసరిగా ఒక ప్రశ్న ఇస్తూ, మొత్తం ఎనిమిది ప్రశ్నలు ఇచ్చి, ఐదింటికి సమాధానం రాయమనాలి. 5×5=25 మా.

ఆ–విభాగము

వ్యాసరూప సమాధాన ప్రశ్నలు–ప్రతి యూనిట్ నుంచి తప్పనిసరిగా రెండు ప్రశ్నలు ఇచ్చి ఒక ప్రశ్నకు సమాధానం రాయమనాలి. మొత్తం ప్రశ్నలు 5. 5×10=50 మా.

✦ మాదిరి ప్రశ్నాపత్రం ✦

అ-విభాగము

క్రింది వానిలో ఐదింటికి సంక్షిప్త సమాధానాలు రాయండి.

ప్రతి సమాధానానికి 5 మార్కులు. 5×5=25 మా.

1. కొండవీడు
2. తెలుగు నవల
3. తెలుగు నాటకం
4. ఆధునిక కవిత్వం
5. కథానిక
6. విమర్శ
7. అనిసెట్టి సుబ్బారావు
8. కాళీపట్నం రామారావు

అ-విభాగము

క్రింది వానిలో అన్ని ప్రశ్నలకు సమాధానాలు రాయండి.

ప్రతి సమాధానానికి 10 మార్కులు. 5×10=50 మా.

9. ఆధునిక కవిత్వ ఆవిర్భావ వికాసాలను వివరించండి.

(లేదా)

కొండవీడులో దువ్వూరి రామిరెడ్డి గారి సందేశాన్ని వివరించండి.

10. తెలుగు కథానికను పరిచయం చేయండి.

(లేదా)

భయం కథలోని రచయిత సందేశాన్ని రాయండి.

11. సాహిత్య ప్రక్రియగా నవల స్థానాన్ని విమర్శించండి.

(లేదా)

రథచక్రాలు నవలలోని ఇతివృత్తాన్ని విశ్లేషించండి.

12. తెలుగు నాటక పరిణామాన్ని గూర్చి రాయండి.

(లేదా)

యక్షగానం నాటికపై సమీక్షా వ్యాసం రాయండి.

13. తెలుగు సాహిత్య విమర్శను పరిచయం చేయండి

(లేదా)

విమర్శ స్వరూప స్వభావాలను వివరిస్తూ, ఉత్తమ విమర్శకుని లక్షణాలను రాయండి.

బి.ఏ., బి.కాం., బి.యస్‌సి., తదితర ప్రోగ్రాములు

అంశం: జనరల్ తెలుగు సెమిస్టర్-3

కోర్సు-3 : సృజనాత్మక రచన

యూనిట్ల సంఖ్య:5 **పీరియడ్ల సంఖ్య:60**

✦ **అభ్యసన ఫలితాలు:-**

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. తెలుగు సాహిత్య అభ్యసన ద్వారా నేర్చుకున్న నైపుణ్యాలను, సృజనాత్మక నైపుణ్యాలుగా మార్చుకోగలరు.

2. విద్యార్థులు భాషాతత్వాన్ని, భాష యొక్క ఆవశ్యకతను, భాష యొక్క ప్రాధాన్యాన్ని గుర్తిస్తారు. మనిషి వ్యక్తిగత జీవనానికి, సామాజికవ్యవస్థ పటిష్టతకు భాష ప్రధానమని తెలుసుకుంటారు. తెలుగుభాషలోని కీలకాంశాలైన 'వర్ణం-పదం-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 నేర్వడంతో పాటు వారిలో రచనా నైపుణ్యాలను పెంపొందించుకోగలరు.

5. సృజన రంగం, ప్రసారమాధ్యమ రంగాల్లో ఉపాధి అవకాశాలను అందిపుచ్చుకోగలరు.

6. అనువాద రంగంలో నైపుణ్యం సంపాదించగలరు.

పాఠ్య ప్రణాళిక

యూనిట్–I: వ్యక్తీకరణ నైపుణ్యాలు

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

యూనిట్–II సృజనాత్మక రచన

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

యూనిట్–III: అనువాద రచన

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

✦ప్రశ్నాపత్ర నమూనా ✦

అ-విభాగము

సంక్షిప్త సమాధాన ప్రశ్నలు - ప్రతి యూనిట్ నుంచి తప్పనిసరిగా ఒక ప్రశ్న ఇస్తూ, మొత్తం ఎనిమిది ప్రశ్నలు ఇచ్చి, ఐదింటికి సమాధానం రాయమనాలి. 5×5=25 మా.

ఆ-విభాగము

వ్యాసరూప సమాధాన ప్రశ్నలు-ప్రతి యూనిట్ నుంచి తప్పనిసరిగా రెండు ప్రశ్నలు ఇచ్చి ఒక ప్రశ్నకు సమాధానం రాయమనాలి. మొత్తం ప్రశ్నలు 5. 5×10=50 మా.

✦ మాదిరి ప్రశ్నాపత్రం ✦

అ–విభాగము

క్రింది వానిలో ఐదింటికి సంక్షిప్త సమాధానాలు రాయండి. 8వ ప్రశ్నకు తప్పనిసరిగా సమాధానం రాయాలి. ప్రతి సమాధానానికి 5 మార్కులు. 5×5=25 మా.

1. భాష–ప్రయోజనాలు 2. వాక్యం–లక్షణాలు 3. టెలివిజన్ రచన 4. రేడియో రచన
5. ఉత్తమ వ్యాసం–లక్షణాలు 6. సంశ్లిష్ట వాక్యం 7. సంపాదకీయాలు
8. క్రింది అంశాన్ని తెలుగులోకి అనువదించి రాయండి.

To many, Indian thought, Indian manners, Indian customs, Indian Philoshophy, Indian Literature are repulsive at the first sight; but let them preservere, let them read, let them become familiar with the great principles underlying these ideas, and it is ninety-nine to one that the charm will come over them, and fascination will be the result. Slow and silent, as the gentle dew that falls in the morning, unseen and unheard yet producing, a most tremendous result, has been the work of the calm, patient, all-suffering spiritual race upon the World of thought.

ఆ–విభాగము

క్రింది వానిలో అన్ని ప్రశ్నలకు సమాధానాలు రాయండి.

ప్రతి సమాధానానికి 10 మార్కులు. 5×10=50 మా.

9. భాషానిర్మాణంలో 'వర్ణం–పదం–వాక్యా'ల ప్రాధాన్యతను వివరించండి. (లేదా)
   భాషను నిర్వచించి, లక్షణాలు రాసి, ప్రామాణిక భాషను పరిచయం చేయండి.
10. ఉత్తమ కవితా లక్షణాలను విశ్లేషించండి.
   (లేదా)
   ఉత్తమ కథా లక్షణాలను వివరించండి.
11. అనువాద సమస్యలను, వాటి పరిష్కారాలను గూర్చి రాయండి.
   (లేదా)
   అనువాద లక్షణాలను వివరిస్తూ, అనువాద పద్ధతులను గురించి రాయండి.
12. ముద్రణా మాధ్యమాన్ని పరిచయం చేస్తూ; దాని పరిధి, వికాసాలను వివరించండి.
   (లేదా)
   పత్రికా రచనను గురించి విశ్లేషణాత్మక వ్యాసం రాయండి.
13. ప్రసార మాధ్యమాల విస్తృతి, ప్రయోజనాలను సమీక్షించండి.
   (లేదా)
   యాంకరింగ్ నిర్వహణ, తీరుతెన్నులను వివరించండి.

SUBJECT EXPERTS

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SYLLABUS VETTED BY

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ANDHA UNIVERSITY

I B.A.,/B.Com.,/B.Sc., SEMESTER – I : GENERAL HINDI PAPER – I

w.e.f. 2020-21

(**Prose, Short Stories and Grammar)**

Credits : 03 Teaching Hrs/Week : 04

SYLLABUS

गद्य संदेश (PROSE)

१. भारतीय साहित्य की एकता - नन्द दुलारे वाजपायी

२. आत्मनिर्भरता - पं. बालकृष्ण भट्ट

३. अन्दर की पवित्रता - डॉ. हजारी प्रसाद द्विवेदी

कथा लोक (SHORT STORIES)

४. ठाकुर का कुआँ - प्रेमचंद

१. वापसी - उषा प्रियंवदा

२. सदाचार का तावीज - हरिशंकर परसाई

व्याकरण (GRAMMAR)

लिंग, वचन,

काल

विलोम शब्द

कार्यालयीन शब्दावली - अंग्रेजी से हिन्दी, हिन्दी से अंग्रेजी

पत्र लेखन - व्यक्तिगत पत्र (छुट्टी पत्र , पिता, मित्र के नाम पत्र, पुस्तक विक्रेता के नाम पत्र)

ANDHRA UNIVERSITY

I B.A.,/B.Com.,/B.Sc., SEMESTER – I : GENERAL HINDI PAPER – I

w.e.f. 2020-21

(**Prose, Short Stories and Grammar)**

Time : 3hrs Max Marks :75

MODEL QUESTION PAPER

PART - A

I. किन्ही पाँच प्रश्नों के उत्तर दीजिए | 5 X 5 = 25

Short Q & ANS

1. Annotation - Prose
2. Annotation - Prose
3. Short Question - Prose
4. Short Question - Short Stories(Non-detailed)
5. Short Question - Short Stories(Non-detailed)
6. Short Question - Short Stories(Non-detailed)
7. Short Question – Grammar
8. Short Question - Grammar

PART - B

II. निम्न लिखित सभी प्रश्नों के उत्तर दीजिए | 5 X10 = 50

1. PROSE

(अथवा)

PROSE

2. PROSE

(अथवा)

Short Stories(Non-detailed)

3. Short Stories(Non-detailed)

(अथवा)

Short Stories(Non-detailed)

4. LETTER WRITING पत्र लेखन

(अथवा)

LETTER WRITING पत्र लेखन

5. a) निम्न लिखित शब्दों के विलोम शब्द लिखिए |

1. 2. 3. 4. 5. 6. 7. 8. 9. 10

b) काल

(अथवा)

निम्न लिखित अंग्रेजी शब्दों का हिन्दी में अनुवाद कीजिए |

(a) 1. Part time 2. Memorandum 3. Conference 4. Certificate 5. Circular

(b) निम्न लिखित हिन्दी शब्दों का अंग्रेजी में अनुवाद कीजिए

6. चुनाव 7. सचिव 8. लेखाकार 9. राज्यपाल 10. नगर निगम

ANDHRA UNIVERSITY

II B.A.,/B.Com.,/B.Sc., SEMESTER – II : GENERAL HINDI PAPER – I

2020-21

(**Prose, Short Stories, Grammar and Letter writing)**

Credits : 03 Teaching Hrs/Week : 4

SYLLABUS

गद्य संदेश (PROSE)

१. भारत में संस्कृति संगम - राम्धारी सिंह दिनकर

३. समय पर मिलाने वाले - हरिशंकर परसाई

२. HIV /AIDS

कथा लोक (SHORT STORIES)

३. हार की जीत - सुदर्शन

४. पुरस्कार - जयशंकर प्रसाद

५. सेवा - ममता कालिया

<u>व्याकरण</u> <u>(GRAMMAR)</u>

कार्यालयीन हिन्दी शब्दावली - अंग्रेजी से हिन्दी, हिन्दी से अंग्रेजी

पदनाम

कारक,

पत्र लेखन (आवेदन पत्र, शिकायती पत्र)

ANDHRA UNIVERSITY

II B.A.,/B.Com.,/B.Sc., SEMESTER – II : GENERAL HINDI PAPER – I

w.e.f.2020-21

(Prose, Short Stories, Grammar and Letter writing)

Time : 3hrs Max Marks :75

MODEL QUESTION PAPER

PART - A

I. किन्ही पाँच प्रश्नों के उत्तर दीजिए | 5 X 5 = 25

Short Q & ANS

9. Annotation - Prose
10. Annotation - Prose
11. Short Question - Prose
12. Short Question - Short Stories(Non-detailed)
13. Short Question - Short Stories(Non-detailed)
14. Short Question - Short Stories(Non-detailed)
15. Short Question - Grammar
16. Short Question - Grammar

PART - B

II. निम्न लिखित सभी प्रश्नों के उत्तर दीजिए | 5 X10 = 50

17. PROSE

(अथवा)

PROSE

18. PROSE

(अथवा)

Short Stories(Non-detailed)

19. Short Stories(Non-detailed)

(अथवा)

Short Stories(Non-detailed)

20. LETTER WRITING पत्र लेखन (आवेदन पत्र, शिकायती पत्र)

(अथवा)

LETTER WRITING पत्र लेखन

21. कारक कितने प्रकार के हैं ? समझाइए |

(अथवा)

a) निम्न लिखित हिन्दी शब्दों का अंग्रेजी में अनुवाद कीजिए |

1. 2. 3. 4. 5.

b) निम्न लिखित हिन्दी पदनामों का अंग्रेजी में अनुवाद कीजिए |

1. 2. 3. 4. 5.

Signature of the members

ANDHRA UNIVERSITY

II B.A.,/B.Com.,/B.Sc., SEMESTER – III : GENERAL HINDI PAPER – II

w.e.f. 2022-23

(**Old & Modern Poetry, History of Hindi Literature, Essays, Translation and Official Letters)**

Credits : 03 Teaching Hrs/Week : 4

SYLLABUS

1.**काव्यदीप :** साखी - १-१०

सूरदास - बाल वर्णन

आगे बढ़, आगे - मैथिलीशरण गुप्त

भिक्षुक - निराला

चरण चले, ईमान अचल हो ! - माखनलाल चतुर्वेदी

2. **हिन्दी साहित्य का इतिहास** :

भक्तिकाल : स्वर्ण युग

ज्ञानाश्रयी शाखा - कबीर, प्रेमाश्रयी शाखा - जायसी

3.**साधारण निबंध :**

नारी शिक्षा का महत्त्व

प्रदूषण का खतरा

विश्व भाषा के रूप में हिन्दी

भारत की वर्तमान समस्याएँ

स्वच्छ भारत

4.अनुवाद : अंग्रेजी से हिन्दी **(** 3-4 lines)

तेलुगु से हिन्दी

5.प्रयोजन मूलक हिन्दी : सरकारी पत्र (Official letters)

ज्ञापन, परिपत्र, सूचना

ANDHRA UNIVERSITY

II B.A.,/B.Com.,/B.Sc., SEMESTER – III : GENERAL HINDI PAPER – II

w.e.f. 2022-23

(**Old & Modern Poetry, History of Hindi Literature, Essays, Translation and Official Letters)**

Time : 3hrs Max Marks :75

MODEL QUESTION PAPER

PART - A

II. किन्ही पाँच प्रश्नों के उत्तर दीजिए | 5 X 5 = 25

Short Q & ANS

1. .Annotation – Old Poetry
2. Annotation - Old Poetry
3. Annotation - Modern Poetry
4. Annotation - Modern Poetry
5. Short Question – Old Poetry
6. Short Question - Modern Poetry
7. Short Question - Official Letter (Functional Hindi)
8. Short Question – History of Hindi Literature

PART - B

II. निम्न लिखित सभी प्रश्नों के उत्तर दीजिए | 5 X10 = 50

9. Modern Poetry – Summary

(अथवा)

Modern Poetry – Summary

10. History of Hindi Literature

(अथवा)

History of Hindi Literature

11. Translation (English to Hindi)

(अथवा)

Translation (Telugu to Hindi)

12. General Essay

(अथवा)

General Essay

13. Official Letter (Functional Hindi)

(अथवा)

Official Letter (Functional Hindi)

Signature of the members

ANDHRA UNIVERSITY

II B.A.,/B.Com.,/B.Sc., SEMESTER–IV : GENERAL HINDI PAPER – II

w.e.f. 2022-23

(**Old & Modern Poetry, History of Hindi Literature, Essays, Translation and Official Letters)**

Credits : 03 Teaching Hrs/Week : 4

SYLLABUS

1.**काव्यदीप :** तुलसी दास के दोहे (१-१०)

रहीम के दोहे (१-१०)

सुख - दुःख - सुमित्रानंदन पंत

कलम और तलवार - रामधारी सिंह दिनकर

भारत - जयशंकर प्रसाद

2. हिन्दी साहित्य का इतिहास :

भक्तिकाल : रामभक्ति शाखा - तुलसी दास,

कृष्ण भक्ति शाखा - सूर दास

3.साधारण निबंध : समाज में नारी का स्थान,

भाषा की समस्या,

मेरा प्रिय कवि/ साहित्यकार

विज्ञान से हानि - लाभ,

राष्ट्र - निर्माण में विद्यार्थियों का योगदान

4.<u>अनुवाद</u> : अंग्रेजी से हिन्दी **(** 3-4 lines)

तेलुगु से हिन्दी

5.<u>प्रयोजन मूलक हिन्दी</u> : सरकारी पत्र (Official letters)

अधि सूचना, अर्ध सरकारी पत्र, नीलाम

ANDHRA UNIVERSITY

II B.A.,/B.Com.,/B.Sc., SEMESTER–IV : GENERAL HINDI PAPER – II

w.e.f.2022-23

(**Old & Modern Poetry, History of Hindi Literature, Essays, Translation and Official Letters)**

Time : 3hrs Max Marks :75

<u>MODEL QUESTION PAPER</u>

PART - A

III. किन्ही पाँच प्रश्नों के उत्तर दीजिए | 5 X 5 = 25
Short Q & ANS

14. .Annotation – Old Poetry
15. Annotation - Old Poetry
16. Annotation - Modern Poetry
17. Annotation - Modern Poetry
18. Short Question – Old Poetry
19. Short Question - Modern Poetry
20. Short Question - Official Letter (Functional Hindi)
21. Short Question – History of Hindi Literature

PART - B

II. निम्न लिखित सभी प्रश्नों के उत्तर दीजिए | 5 X10 = 50

22. Modern Poetry – Summary

(अथवा)

Modern Poetry – Summary

23. History of Hindi Literature

(अथवा)

History of Hindi Literature

24. Translation (English to Hindi)

(अथवा)

Translation (Telugu to Hindi)

25. General Essay

(अथवा)

General Essay

26. Official Letter (Functional Hindi)

(अथवा)

Official Letter (Functional Hindi)

Signature of the Members

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

(A Statutory body of the Government of Andhra Pradesh)

3rd,4th and 5th floors, Neeladri Towers, Sri Ram Nagar, 6th Battalion Road,
Atmakur(V), Mangalagiri(M), Guntur-522 503, Andhra Pradesh
Web: www.apsche.org **Email**: acapsche@gmail.com

REVISED SYLLABUS OF B.A. /B.Sc. MATHEMATICS UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

PROGRAMME: THREE-YEAR B.A. /B.Sc. MATHEMATICS

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Q.P.)

For Fifteen Courses of 1, 2, 3 & 4 Semesters)

(To be Implemented from 2020-21 Academic Year)

A.P. STATE COUNCIL OF HIGHER EDUCATION

B.A./B.Sc. MATHEMATICS

REVISED SYLLABUS FOR CORE COURSES

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

CORE COURSES STRUCTURE

(Sem-I to Sem-IV)

Course	Subject	Hrs.	Credits	IA	ES	Total
Course -I	Differential Equations & Differential Equations Problem Solving Sessions	6	5	25	75	100
Course -II	Three dimensional analytical Solid geometry & Three dimensional analytical Solid Geometry Problem Solving Sessions	6	5	25	75	100
Course -III	Abstract Algebra & Abstract Algebra Problem Solving Sessions	6	5	25	75	100
Course -IV	Real Analysis & Real Analysis Problem Solving Sessions	6	5	25	75	100
Course -V	Linear Algebra & Linear Algebra Problem Solving Sessions	6	5	25	75	100

COURSE-I

CBCS/ SEMESTER SYSTEM

B.A./B.Sc. MATHEMATICS (w.e.f. 2020-21 Admitted Batch)

DIFFERENTIAL EQUATIONS

SYLLABUS (75 Hours)

Course Outcomes:

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

1.Solve linear differential equations

2.Convertnonexact homogeneous equations to exact differential equations by using integrating factors.

3.Know the methods of finding solutions ofdifferential equations of the firstorder but not of the firstdegree.

4.Solvehigher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.

5. Understand the concept and apply appropriate methods for solving differential equations.

Course Syllabus:

UNIT – I (12 Hours)

Differential Equations of first order and first degree:

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

UNIT – II (12 Hours)

Orthogonal Trajectories

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

Equations solvable for *p*; Equations solvable for *y*; Equations solvable for *x*; Equations that do not contain x (or y); Equations homogeneous in x and y;Equations of the first degree in *x* and *y* – Clairaut's Equation.

UNIT – III (12 Hours)

Higher order linear differential equations-I:

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

General Solution of f(D)y=Q when Q is a function of x, $\frac{1}{f(D)}$ is expressed as partial fractions.

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

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

UNIT – IV (12 Hours)

Higher order linear differential equations-II:

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

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

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

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

P.I. of f(D)y = Q when Q= x^mV **,** where V is a function of x.

UNIT –V (12 Hours)

Higher order linear differential equations-III :

Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation, Legendre's linear equations, miscellaneous differential equations.

Co-Curricular Activities(15 Hours)

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

Text Book :

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

Reference Books :

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

COURSE-II

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Syllabus (75 Hours)

Course Outcomes:

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

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

Course Syllabus:

UNIT – I (12 Hours)

The Plane :

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

UNIT – II (12 hrs)

The Line :

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

UNIT – III (12 hrs)

The Sphere :

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle;

Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes;

UNIT – IV (12 hrs)

The Sphere and Cones :

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified from of the equation of two spheres.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone;

UNIT – V (12 hrs)

Cones :

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

Co-Curricular Activities(15 Hours)

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

Text Book :

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

Reference Books :

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

COURSE-III

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

ABSTRACT ALGEBRA

SYLLABUS (75 Hours)

Course Outcomes:

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

1.acquire the basic knowledge and structure of groups, subgroups and cyclic groups.

2. get the significance of the notation of a normal subgroups.

3. get the behavior of permutations and operations on them.

4. study the homomorphisms and isomorphisms with applications.

5.understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.

6. understand the applications of ring theory in various fields.

Course Syllabus:

UNIT – I (12 Hours)

GROUPS :

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

UNIT – II (12 Hours)

SUBGROUPS :

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition- examples-criterion for a complex to be a subgroups. Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Co-sets and Lagrange's Theorem :

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

UNIT –III (12 Hours)

NORMAL SUBGROUPS :

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

HOMOMORPHISM :

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

UNIT – IV (12 Hours)

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.

UNIT – V (12 Hours)

RINGS :

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

Co-Curricular Activities(15 Hours)

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

Text Book :

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

Reference Books :

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

COURSE-IV

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

REAL ANALYSIS

SYLLABUS (75 Hours)

Course Outcomes:

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

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

Course Syllabus:

UNIT – I (12 Hours)

REAL NUMBERS :

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).

Real Sequences:

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

UNIT –II (12 Hours)

INFINITIE SERIES :

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

1. P-test
2. Cauchy's n^{th} root test or Root Test.

3. D'-Alemberts' Test or Ratio Test.

4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence.

UNIT – III (12 Hours)

CONTINUITY :

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

Continuous functions : Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV (12 Hours)

DIFFERENTIATION AND MEAN VALUE THEORMS :

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

UNIT – V (12 Hours)

RIEMANN INTEGRATION :

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

Co-Curricular Activities(15 Hours)

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

Text Book:

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

Reference Books:

1.A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.

2.Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisinghania, published by S. Chand & Company Pvt. Ltd., New Delhi.

COURSE-V

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

LINEAR ALGEBRA

SYLLABUS (75 Hours)

Course Outcomes:

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

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

Course Syllabus:

UNIT – I (12 Hours)

Vector Spaces-I:

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

UNIT –II (12 Hours)

Vector Spaces-II:

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

UNIT –III (12 Hours)

Linear Transformations:

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

UNIT –IV (12 Hours)

Matrix :

Matrices, Elementary Properties of Matrices, Inverse Matrices, Rank of Matrix, Linear Equations, Characteristic equations, Characteristic Values & Vectors of square matrix, Cayley – Hamilton Theorem.

UNIT –V (12 Hours)

Inner product space :

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

Co-Curricular Activities(15 Hours)

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

Text Book:

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

Reference Books :

1.Matrices by Shanti Narayana, published by S.Chand Publications.

2. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition),New Delhi.

3. Linear Algebra by Stephen H. Friedberg et. al. published by Prentice Hall of India Pvt. Ltd. 4^{th} Edition, 2007.

Recommended Question Paper Patterns and Models

BLUE PRINT FOR QUESTION PAPER PATTERN

COURSE-I, DIFFERENTIAL EQUATIONS

Unit	**TOPIC**	**S.A.Q**(including choice)	**E.Q**(including choice)	**Total Marks**
I	Differential Equations of 1^{st} order and 1^{st} degree	2	2	30
II	Orthogonal Trajectories, Differential Equations of 1^{st} order but not of 1^{st} degree	2	2	30
III	Higher Order Linear Differential Equations (with constant coefficients) – I	1	2	25
IV	Higher Order Linear Differential Equations (with constant coefficients) – II	2	2	30
V	Higher Order Linear Differential Equations (with non constant coefficients)	1	2	25
TOTAL		8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

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Total Marks = 75 M

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CBCS/ SEMESTER SYSTEM

(W.e.f 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-I, DIFFERENTIAL EQUATIONS

MATHEMATICS MODEL PAPER

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

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks5 X 5 M=25 M

1. Solve $\left(1+e^{x/y}\right)dx+e^{x/y}\left(1-\frac{x}{y}\right)dy=0.$
2. Solve $\left(y-e^{\sin^{-1}x}\right)\frac{dx}{dy}+\sqrt{1-x^2}=0$
3. Solve $y+px=p^2x^4.$
4. Solve $(px-y)(py+x)=2p$
5. Solve $(D^2-3D+2)=\cosh x$
6. Solve$(D^2-4D+3)y=\sin 3x\cos 2x.$
7. Solve $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+13y=8e^{3x}\sin 2x.$
8. Solve $x^2y''-2x(1+x)y'+2(1+x)y=x^3$

SECTION - B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

9 a) Solve $x\frac{dy}{dx}+y=y^2\log x.$

(Or)

9 b) Solve $\left(y+\frac{1}{3}y^3+\frac{1}{2}x^2\right)dx+\frac{1}{4}(x+xy^2)\,dy=0.$

10 a) Solve$p^2+2pycotx=y^2.$

(Or)

10 b) Find the orthogonal trajectories of the family of curves

$x^{2/3}+y^{2/3}=a^{2/3}$ where 'a' is the parameter.

11 a) Solve $(D^3 + D^2 - D - 1)y = \cos 2x$.

(Or)

11 b) Solve $(D^2 - 3D + 2)y = \sin e^{-x}$.

12 a) Solve $(D^2 - 2D + 4)y = 8(x^2 + e^{2x} + \sin 2x)$

(Or)

12 b) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = xe^x \sin x$

13 a) Solve $(D^2 - 2D)y = e^x \sin x$ by the method of variation of parameters.

(Or)

13 b) Solve $3x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = x$

BLUE PRINT FOR QUESTION PAPER PATTERN

COURSE-II, THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Unit	**TOPIC**	**S.A.Q**(including choice)	**E.Q**(including choice)	**Total Marks**
I	The Plane	2	2	30
II	The Right Line	2	2	30
III	The Sphere	2	2	30
IV	The Sphere & The Cone	1	2	25
V	The Cone	1	2	25
TOTAL		8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

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Total Marks = 75 M

.....

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-II, THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

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

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M

1. Find the equation of the plane through the point (-1,3,2) and perpendicular to the planes x+2y+2z=5 and 3x+3y+2z=8.
2. Find the bisecting plane of the acute angle between the planes 3x-2y-6z+2=0, -2x+y-2z-2=0.
3. Find the image of the point (2,-1,3) in the plane 3x-2y+z =9.
4. Show that the lines $2x + y - 4 = 0 = y + 2z$ and $x + 3z - 4 = 0$, $2x + 5z - 8 = 0$ are coplanar.
5. A variable plane passes through a fixed point (a, b, c). It meets the axes in A,B,C. Show that the centre of the sphere OABC lies on $ax^{-1}+by^{-1}+cz^{-1}=2$.
6. Show that the plane 2x-2y+z+12=0 touches the sphere $x^2+y^2+z^2-2x-4y+2z-3=0$ and find the point of contact.
7. Find the equation to the cone which passes through the three coordinate axes and the lines $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and $\frac{x}{2} = \frac{y}{1} = \frac{z}{1}$
8. Find the equation of the enveloping cone of the sphere $x^2 + y^2 + z^2 + 2x - 2y = 2$ with its vertex at (1, 1, 1).

SECTION - B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

9(a) A plane meets the coordinate axes in A, B, C. If the centroid of ΔABC is (a,b,c), show that the equation of the plane is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3$.

(OR)

(b) A variable plane is at a constant distance p from the origin and meets the axes in A,B,C. Show that the locus of the centroid of the tetrahedron OABC is $x^{-2}+y^{-2}+z^{-2}=16p^{-2}$.

10(a) Find the shortest distance between the lines

$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$; $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$.

(OR)

(b) Prove that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$; $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar. Also find their point of intersection and the plane containing the lines.

11 (a) Show that the two circles $x^2+y^2+z^2-y+2z=0$, $x-y+z=2$; $x^2+y^2+z^2+x-3y+z-5=0$, $2x-y+4z-1=0$ lie on the same sphere and find its equation.

(OR)

(b) Find the equation of the sphere which touches the plane $3x+2y-z+2=0$ at $(1,-2,1)$ and cuts orthogonally the sphere $x^2+y^2+z^2-4x+6y+4=0$.

12 (a) Find the limiting points of the coaxial system of spheres $x^2+y^2+z^2-8x+2y-2z+32=0$, $x^2+y^2+z^2-7x+z+23=0$.

(OR)

(b) Find the equation to the cone with vertex is the origin and whose base curve is $x^2+y^2+z^2+2ux+d=0$.

13 (a) Prove that the equation $\sqrt{fx} \pm \sqrt{gy} \pm \sqrt{hz} = 0$ represents a cone that touches the coordinate planes and find its reciprocal cone.

(OR)

(b) Find the equation of the sphere $x^2+y^2+z^2-2x+4y-1=0$ having its generators parallel to the line $x=y=z$.

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COURSE-III, ABSTRACT ALGEBRA

Unit	**TOPIC**	**S.A.Q**(including choice)	**E.Q**(including choice)	**Total Marks**
I	Groups	2	2	30
II	Subgroups, Cosets & Lagrange's theorem	1	2	25
III	Normal Subgroups and Homomorphism	1	2	25
IV	Permutations and Cyclic groups	2	2	30
V	Rings	2	2	30
Total		8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

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Total Marks = 75 M

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CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-III, ABSTRACT ALGEBRA

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

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M

1. Show that the set G=$\{x/x = 2^a 3^b \text{ and } a,b \in Z\}$ is a group under multiplication

2. Define order of an element. In a group G, prove that if $a \in G$ then $O(a) = O(a)^{-1}$.

3. If H and K are two subgroups of a group G, then prove that HK is a subgroup ⇔ HK=KH

4.If G is a group and H is a subgroup of index 2 in G then prove that H is a normal subgroup.

5. Examine whether the following permutations are even or odd

i) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 6 & 1 & 4 & 3 & 2 & 5 & 7 & 8 & 9 \end{pmatrix}$

ii) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 3 & 2 & 4 & 5 & 6 & 7 & 1 \end{pmatrix}$

6. Prove thata group of prime order is cyclic.

7.Prove that the characteristic of an integral domain is either prime or zero.

8. If F is a field then prove that $\{0\}$ and F are the only ideals of F.

SECTION - B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

9 a) Show that the set of n^{th} roots of unity forms an abelian group under multiplication.

(Or)

9 b) In a group G, for $a, b \in G$, O(a)=5, b ≠ e and $aba^{-1} = b^2$. Find O(b).

10 a) The Union of two subgroups is also a subgroup ⇔ one is contained in the other.

(Or)

b) State and prove Langrage's theorem.

11 a) Prove that a subgroup H of a group G is a normal subgroup of G iff the product of two right cosets of H in G is again a right coset of H in G.

(Or)

11 b) State and prove fundamental theorem of homomorphisms of groups.

12 a) Let S_n be the symmetric group on n symbols and let A_n be the group of even permutations. Then show that A_n is normal in S_n and $O(A_n) = \frac{1}{2}(n!)$

(Or)

12 b)prove thatevery subgroup of cyclic group is cyclic.

13 a) Prove that every finite integral domain is a field.

(Or)

13 b) Define principal idea. Prove that every ideal of Z is a principal ideal.

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COURSE-IV, REAL ANALYSIS

Unit	**TOPIC**	**S.A.Q**(including choice)	**E.Q**(including choice)	**Total Marks**
I	Real Number System and Real Sequence	2	2	30
II	Infinite Series	1	2	25
III	Limits and Continuity	1	2	25
IV	Differentiation and Mean Value Theorem	2	2	30
V	Riemann Integration	2	2	30
	TOTAL	8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

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Total Marks = 75 M

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CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-IV, REAL ANALYSIS

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

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M

1.Prove that every convergent sequence is bounded.

2. Show that $\lim(\frac{1}{(n+1)^2}+\frac{1}{(n+2)^2}+\text{----------}+\frac{1}{(n+n)^2})=0$.

3. Test the convergenceof the series $\sum_{n=1}^{\infty}(\sqrt[3]{n^3+1}-n)$.

4. Examine for continuity of the function *f* defined by $f(x)=|x|+|x-1|$ at x=0 and 1.

5. Show that $f(x)=x\sin\frac{1}{x},\ x\neq 0; f(x)=0, x=0$ is continuous but not derivable at x=0.

6.Verify Rolle's theorem for the function $f(x) = x^3- 6x^2+11x-6$ on $[1,3]$.

7. If $f(x)=x^2\ \forall\, x\in[0,1]$ and $p=\{0,\frac{1}{4},\frac{2}{4},\frac{3}{4},1\}$ then find L(p, f) and U(p, f).

8.prove that if $f:[a,b]\to R$ is continuous on [a, b] then f is R- integrable on [a, b].

SECTION –B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

9.(a)If $s_n=1+\frac{1}{2!}+\frac{1}{3!}+-----+\frac{1}{n!}$ then show that $\{s_n\}$ converges.

(OR)

(b) State and prove Cauchy's general principle of convergence.

10.(a) State and Prove Cauchy's nth root test.

(OR)

(b) Test the convergence of $\sum \frac{x^n}{x^n+a^n}$ $(x > 0, a > 0)$.

11.(a) Let f: R$\rightarrow$ R be such that

$$f(x) = \frac{\sin(a+1)x+\sin x}{x} \text{ for } x < 0$$

$$= c \qquad \text{for } x = 0$$

$$= \frac{(x+bx^2)^{1/2}-x^{1/2}}{bx^{3/2}} \text{ for } x > 0$$

Determine the values of a, b, c for which the function f is continuous at x=0.

(OR)

(b) Define uniform continuity, If a function f is continuous on [a b] then f is uniformly continuous on [a b]

12.(a) Using Lagrange's theorem, show that $x > \log(1+x) > \frac{x}{(1+x)} \forall\, x > 0$.

(OR)

(b) State and prove Cauchy's mean value theorem.

13.(a) State and prove Riemman's necessary and sufficient condition for R- integrability.

(OR)

(b) Prove that $\frac{\pi^3}{24} \leq \int_0^{\pi} \frac{x^2}{5+3\cos x}\,dx \leq \frac{\pi^3}{6}$.

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COURSE-V, LINEAR ALGEBRA

Unit	TOPIC	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
I	Vector spaces - I	2	2	30
II	Vector spaces - II	1	2	25
III	Linear Transformation	2	2	30
IV	Char. values and char. vectors	1	2	25
V	Inner product spaces	2	2	30
Total		8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

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Total Marks = 75 M

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CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-V, LINEAR ALGEBRA

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

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M

1. Let p, q, r be fixed elements of a field F. Show that the set W of all triads (x, y, z) of elements of F, such that px+qy+rz=0 is a vector subspace of $V_3(R)$.

2. Define linearly independent &linearly dependent vectors in a vector space. If α, β, γ are linearly independent vectors of $V(R)$ then show that $\alpha+\beta, \beta+\gamma, \gamma+\alpha$ are also linearly independent.

3. Prove that every set of $(n+1)$ or more vectors in an n dimensional vector space is linearly dependent.

4. The mapping T : $V_3(R) \rightarrow V_3(R)$ is defined by T(x,y,z) = (x-y,x-z). Show that T is a linear transformation.

5. Let $T: R^3 \rightarrow R^2$ and $H: R^3 \rightarrow R^2$ be defined by T (x, y, z)= (3x, y+z) and H (x, y, z)= (2x-z, y). Compute i) T+H ii) 4T-5H iii) TH iv) HT.

6. If the matrix A is non-singular, show that the eigen values of A^{-1} are the reciprocals of the eigen values of A.

7. State and prove parallelogram law in an inner product space V(F).

8. Prove that the set S = $\left\{\left(\frac{1}{3},\frac{-2}{3},\frac{-2}{3}\right),\left(\frac{2}{3},\frac{-1}{3},\frac{2}{3}\right),\left(\frac{2}{3},\frac{2}{3},\frac{-1}{3}\right)\right\}$ is an orthonormal set in the inner product space $R^3(R)$ with the standard inner product.

SECTION - B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

9(a)) Define vector space. Let V (F) be a vector space. Let W be a non empty sub set of V. Prove that the necessary and sufficient condition for W to be a subspace of V is $a, b \in F$ and $\alpha, \beta \epsilon V \Rightarrow a\alpha + b\beta \epsilon W$.

(OR)

(b) Prove that the four vectors (1,0,0), (0,1,0), (0,0,1) and (1,1,1) of $V_3(C)$ form linearly dependent set, but any three of them are linearly independent.

10(a)Define dimension of a finite dimensional vector space. If W is a subspace of a finite dimensional vector space V(F) then prove that W is finite dimensional and dim W$\leq n$.

(OR)

(b) If W be a subspace of a finite dimensional vector space V(F) then Prove that $\dim {}^{V}/_{W} = \dim V - \dim W$.

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

(OR)

(b) State and prove Rank Nullity theorem.

12(a) Find the eigen values and the corresponding eigen vectors of the matrix

$$A=\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}.$$

(OR)

(b) State and prove Cayley-Hamilton theorem.

13(a) State and prove Schwarz's inequality in an Inner product space V(F).

(OR)

(b) Given $\{(2,1,3),(1,2,3),(1,1,1)\}$ is a basis of R^3(R).Construct an orthonormal basis using Gram-Schmidt orthogonalisation process.

SUBJECT EXPERTS

Prof. GVR Babu
Dept of Mathematics,
Andhra University,
Visakhapatnam

Dr.K.Chitti Babu,
Lecturer in Mathematics,
Govt. Degree College,
Ramachandrapuram

SYLLABUS VETTED BY

Prof.D.Bharathi,
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ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

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REVISED SYLLABUS OF B.Sc. PHYSICS
(FOR MATHEMATICS COMBINATIONS)
UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

PROGRAMME: THREE-YEAR B.Sc.

(Physics for Mathematics Combinations)

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Q.P.)

For Fifteen Courses of 1, 2, 3 & 4 Semesters)

(To be Implemented from 2020-21 Academic Year)

AP STATE COUNCIL OF HIGHER EDUCATION

B.Sc. PHYSICSSYLLABUS UNDER CBCS

[For Mathematics combinations]

w.e.f. 2020-21 (Revised in May 2020)

First Semester

Course I: Mechanics, Waves and Oscillations

Practical Course I (Lab-1)

Second Semester

Course II: Wave Optics

Practical Course II (Lab-2)

Third Semester

Course III: Heat and Thermodynamics

Practical Course III (Lab-3)

Fourth Semester

Course IV: Electricity, Magnetism and Electronics

Practical Course IV (Lab- 4)

Course V:Modern Physics

Practical Course V (Lab-V)

B.Sc.PHYSICS COURSE STRUCTURE UNDER CBCS

Year	***Semester***	***Course***	***Title of the Course***	***Marks***	***No.ofHrs /Week***	***No.of Credits***
I	I	I	Mechanics, Waves and Oscillations	100	4	03
			Practical Course- I	50	2	02
	II	II	Wave Optics	100	4	03
			Practical Course – II	50	2	02
II	III	III	Heat and Thermodynamics	100	4	03
			Practical Course – III	50	2	02
	IV	IV	Electricity, Magnetism and Electronics	100	4	03
			Practical Course – IV	50	2	02
		V	Modern Physics	100	4	03
			Practical Course –V	50	2	02
Total No. of Courses : **05 (Five)**						

B.Sc. PHYSICS SYLLABUS UNDER CBCS

For Mathematics Combinations

[2020-21 Batch onwards]

I Year B.Sc.-Physics:I Semester

Course I: MECHANICS, WAVES AND OSCILLATIONS

Work load:60 hrs per semester **4 hrs/week**

Course outcomes:

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

- *Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.*
- *Apply the rotational kinematic relations, the principle and working of gyroscope and itapplicationsand the precessional motion of a freely rotating symmetric top.*
- *Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.*
- *Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.*
- *Examinephenomena of simple harmonic motionand the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.*
- *Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.*
- *Figure outthe formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.*

UNIT-I:

1. Mechanics of Particles (5 hrs)

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.

2. Mechanics of Rigid bodies (7 hrs)

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 atom and nucleus in magnetic field, Precession of the equinoxes

Unit-II:

3. Motion in a Central Force Field (12hrs)

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:

4. Relativistic Mechanics (12hrs)

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:

5. Undamped, Damped and Forced oscillations: (07 hrs)

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.

6. Coupled oscillations: (05 hrs)

Coupled oscillators-Introduction, Two coupled oscillators, Normal coordinates and Normal modes- N-coupled oscillators and wave equation

Unit-V:

7. Vibrating Strings: (07 hrs)

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,Melde's strings.

8. Ultrasonics: (05 hrs)

Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR

REFERENCE BOOKS:

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

Practical Course 1: Mechanics, Waves and Oscillations

Work load: 30 hrs per semester **2 hrs/week**

Course outcomes (Practicals):

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

- Perform experiments on Properties of matter such as the determination of moduli of elasticity *viz.*, Young's modulus, Rigidity modulus of certain materials; Surface tension of water , Coefficient of viscosity of a liquid , Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.
- Know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum.
- Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.
- Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.
- Demonstrate the formation of stationary waves on a string in Melde's string experiment.
- Observe the motion of coupled oscillators and normal modes.

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.

12. Coupled oscillators
13. Verification of laws of vibrations of stretched string –Sonometer
14. Determination of frequency of a bar –Melde's experiment.
15. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.

RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

- Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
- Student seminars (on topics of the syllabus and related aspects (individual activity)
- Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)
- Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)
- Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

- Group Discussion
- Visit to Research Stations, Science Museum Centres to understand the basic principles of mechanics with live examplesand related industries
- Visit to Satellite launching station at Sri Harikota.

RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

- The oral and written examinations (Scheduled and surprise tests)
- Problem-solving exercises
- Practical assignments and Observation of practical skills
- Individual and group project reports
- Efficient delivery using seminar presentations
- Viva voce interviews.

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B.Sc. PHYSICS SYLLABUS UNDER CBCS

For Mathematics Combinations

[2020-21 Batch onwards]

I Year B.Sc.-Physics: II Semester

Course-II: WAVE OPTICS

Work load:60 hrs per semester **4 hrs/week**

Course outcomes:

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

- *Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude*.
- *Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.*
- *Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.*
- *Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..*
- *Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.*
- *Explain about the different aberrations in lenses and discuss the methods of minimizing them.*
- *Understand the basic principles of fibreoptic communication andexplore the field of Holography and Nonlinear optics and their applications.*

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, Basic principle of LCDs

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 Lasersand 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:

- BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
- Optics-Murugeshan, S.Chand& Co.

- Unified Physics Vol.IIOptics, Jai PrakashNath&Co.Ltd., Meerut
- Optics,F.A. Jenkins and H.G.White, McGraw-Hill
- Optics, AjoyGhatak,TataMcGraw-Hill.
- Introduction of Lasers – Avadhanulu, S.Chand& Co.
- Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Practical Course II: Wave Optics

Work load:30hrs **2 hrs/week**

Course outcomes (Practicals):

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

1. *Gain hands-on experience of using various optical instruments like spectrometer, polarimeterand making finer measurements of wavelength of light using Newton Ringsexperiment, diffraction grating etc.*
2. *Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution*
3. *Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.*
4. *Be familiar with the determination of refractive index of liquid by Boy's methodand the determination of thickness of a thin wire by wedge method.*

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.

RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

- Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

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

GENERAL

- Group Discussion
- Visit to Research Stations/laboratories and related industries

RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

- The oral and written examinations (Scheduled and surprise tests),
- Practical assignments and laboratory reports,
- Efficient delivery using seminar presentations,
- Viva voce interviews.

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B.Sc. PHYSICS SYLLABUS UNDER CBCS

For Mathematics Combinations

[2020-21 Batch onwards]

II Year B.Sc.-Physics: III Semester

Course-III: HEAT AND THERMODYNAMICS

Work load:60hrs per semester **4 hrs/week**

Course outcomes:

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

- *Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases*
- *Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration,the concept of entropy,the thermodynamic potentials and their physical interpretations.*
- *Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency*
- *Develop critical understanding of concept of Thermodynamic potentials,the formulation of Maxwell's equations and its applications.*
- *Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures.*
- *Examine the nature of black body radiations and the basic theories.*

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-Clayperon's equation (ii) Value of C_P-C_V (iii) Value of C_P/C_V (iv) Joule-Kelvin coefficient for ideal and Van der Waals' 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 pyroheliometer, Estimation of surface temperature of Sun.

REFERENCE BOOKS:

- BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.
- Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&Co.Ltd., Meerut
- Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
- Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012
- Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
- University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

Practical Course-III: Heat and Thermodynamics

Work load: 30 hrs **2 hrs/week**

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

- *Perform some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, variation of thermo-emf of athermocouple with temperature difference at its two junctions, calibration of a thermocouple and Specific heat of a liquid.*

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.

RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

- Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
- Student seminars (on topics of the syllabus and related aspects (individual activity))
- Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)
- Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)

- Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

- Group Discussion
- Visit to Research Stations/laboratories and related industries
- Others

RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

- The oral and written examinations (Scheduled and surprise tests),
- Problem-solving exercises,
- Efficient delivery using seminar presentations,
- Viva voce interviews.

***

B.Sc. PHYSICS SYLLABUS UNDER CBCS

For Mathematics Combinations

[2020-21 Batch onwards]

II Year B.Sc.-Physics: IV Semester

Course-IV: ELECTRICITY, MAGNETISM AND ELECTRONICS

Work load:60 hrs per semester **4 hrs/week**

Course outcomes:

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

- *Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.*
- *Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.*
- *Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.*
- *Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.*
- *Phenomenon of resonance in LCR AC-circuits, sharpness of resonance,Q-factor,Power factor and the comparative study of series and parallel resonant circuits.*
- *Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors*
- *Understand the operation of basic logic gates and universal gates and their truth tables.*

UNIT-I

1. 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 (i) dipole (ii)uniformly charged sphere

2.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

3.Magnetostatics: (6 hrs)

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

4.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 and Electromagnetic damping

UNIT-III

5.Alternating currents: (6 hrs)

Alternating current - Relation between current and voltage in LR and CR circuits,Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q –factor, Power in ac circuits, Power factor.

6.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)

UNIT-IV

7. Basic Electronic devices: (12 hrs)

PN junction diode, Zenerdiode andLight 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 characteristicsofa transistor in CE mode, Relation between alpha, beta and gamma; Hybrid parameters, Determination of hybrid parameters from transistor characteristics; Transistor as an amplifier.

UNIT-V:

8. 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

- BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
- Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
- Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal& Co.
- Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
- Electricity and Magnetism, R.Murugeshan, S. Chand & Co.
- Principles of Electronics, V.K. Mehta, S.Chand& Co.,
- Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHill Edition.

Practical CourseIV:Electricity, Magnetism and Electronics

Work load: 30 hrs **2 hrs/week**

Course outcomes (Practicals):

On successful completion of this practical course the student will be able to;

- *Measure the current sensitivity and figure of merit of a moving coil galvanometer.*
- *Observe the resonance condition in LCR series and parallel circuit*
- *Learn how a sonometer can be used to determine the frequency of AC-supply.*
- *Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.*
- *Understand the operation of PN junction diode, Zener diode and a transistor and their V-I characteristics.*
- *Construct the basic logic gates, half adder and full adder and verify their truth tables. Further, the student will understand how NAND and NOR gates can be used as universal building blocks.*

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

RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

- Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
- Student seminars (on topics of the syllabus and related aspects (individual activity))
- Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)
- Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)
- Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

- Group Discussion
- Visit to Research Stations/laboratories and related industries
- Others

RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

- The oral and written examinations (Scheduled and surprise tests),
- Practical assignments and laboratory reports,
- Observation of practical skills,
- Efficient delivery using seminar presentations,
- Viva voce interviews.

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B.Sc. PHYSICS SYLLABUS UNDER CBCS

For Mathematics Combinations

[2020-21 Batch onwards]

II Year B.Sc.-Physics: IV Semester

Course V: MODERN PHYSICS

Work load:60hrs per semester **4 hrs/week**

Course outcomes:

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

- *Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.*
- *Develop critical understanding of concept of Matter waves and Uncertainty principle.*
- *Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.*
- *Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.*
- *Classify Elementary particles based on their mass, charge, spin, half life and interaction.*
- *Get familiarized with the nano materials, their unique properties and applications.*
- *Increase the awareness and appreciation of superconductors and their practical applications.*

UNIT-I :

1. 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:

2. 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 (Diffraction by a single slit)and photons(Gamma ray microscope),Bohr's principle of complementarity.

UNIT-III:

3. 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(InfinitePotential Well) and (ii) one dimensional harmonic oscillator

UNIT-IV:

4. 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:

5. 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, Next Generation Computer chips, elimination of pollutants, sensors*)

6. 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

- BSc Physics, Vol.4, Telugu Akademy, Hyderabad
- Atomic Physics by J.B. Rajam; S.Chand& Co.,
- Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
- Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
- Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
- S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publ.Co.)
- K.K.Chattopadhyay&A.N.Banerjee, Introd.to Nanoscience and Technology(PHI LearningPriv.Limited).
- Nano materials, A K Bandopadhyay. New Age International Pvt Ltd (2007)
- Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, Baldev Raj,BB Rath

and J Murday-Universities Press-IIM

Practical Course V:Modern Physics

Work load: 30 hrs **2 hrs/week**

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

- *Measure charge of an electron ande/m value of an electron by Thomson method.*
- *Understand how the Planck's constant can be determined using Photocell and LEDs.*
- *Study the absorption of α-rays and β-rays, Range of β-particles and the characteristics of GM counter*
- *Determine the Energy gap of a semiconductor using thermistor and junction diode.*

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

RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

- Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
- Student seminars (on topics of the syllabus and related aspects (individual activity)

- Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
- Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)
- Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

- Group Discussion
- Visit to Research Stations/laboratories and related industries
- Others

RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

- The oral and written examinations (Scheduled and surprise tests),
- Practical assignments and laboratory reports,
- Efficient delivery using seminar presentations,
- Viva voce interviews.

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Note:

1. The duration of the examination for each theory course is 3.00 hrs.
   The duration of each practical examination is 3 hrs with 50 marks

2. Each course in theory is of 100 marks and practical course is of 50 marks.
   - Semester End University Examination in Theory Course: 75 marks [External evaluation]
   - Mid-Semester Examination in Theory Course at the college level: 25 marks [Internal evaluation]

3. The University (external) examination for Theory and Practical shall be conducted at the end of each Semester.

4. In each semester the evaluation in Practical courses shall be done by an external examiner appointed by the University.
   There shall not be Internal valuation in any semester end practical examinations.

5. The candidate shall prepare and submit at the time of practical examination a certified Record based on the practical course with a minimum of **6** experiments from each semester.

6. Numerical Problems must be solved at the end of every chapter of all Units.

7. Numerical problems, each having a weightage of 4 marks, should be asked in the Semester end University examinations.

8. The minimum passing marks in each theory course is 40 (External:30 and Internal:10)
   The minimum passing marks in each Practical/Lab course is 20.

9. The teaching work load per week for semesters I to IV is 4 hours for theory course and 2 hours for all laboratory (practical) courses.

10. Visits to industry, national research laboratories, and scientific exhibitions should be encouraged.

11. The syllabus for Practical courses is same for both Mathematics and Non-Mathematics combinations.

12. The marks distribution for the Semester End practical examination is as follows:

(i)	*Formula/ Principle / Statement with explanation of symbols and*	05
(ii)	*Diagram/Circuit Diagram / Tabular Columns … … … … …*	10
(iii)	*Setting up of the experiment and taking readings/Observations*	10
(iv)	*Calculations (explicitly shown) + Graph + Result with Units…*	10
(v)	*Viva-voce … … … … … … … … … … … … … … … … …*	05
(vi)	*Class Records (to be valued at the time of practical*	10
	Total Marks :	**50**

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B.Sc. PHYSICS

[For Mathematics combinations]

w.e.f. 2020-21 (Revised in May 2020)

MODEL QUESTION PAPER COMMON FOR ALL FIVE THEORY COURSES

Time : 3 hrs *Max marks : 75*

SECTION-A

(Essay Type Questions) *Marks* : 5x10M = 50M

Answer All questions with internal choice from each Unit

1. Essay type question from Unit-I

   Or

   Essay type question from Unit-I

2. Essay type question from Unit-II

   Or

   Essay type question from Unit-II

3. Essay type question from Unit-III

   Or

   Essay type question from Unit-III

4. Essay type question from Unit-IV

   Or

   Essay type question from Unit-IV

5. Essay type question from Unit-V

   Or

   Essay type question from Unit-V

SECTION-B

(Short Answer Type Questions) *Marks* : 5x5M = 25M

Answer any five out of the following ten questions

6. Short answer type question from Unit-I
7. Short answer type question from Unit-I
8. Short answer type question from Unit-II
9. Short answer type question from Unit-II
10. Short answer type question from Unit-III
11. Short answer type question from Unit-III
12. Short answer type question from Unit-IV
13. Short answer type question from Unit-IV
14. Short answer type question from Unit-V
15. Short answer type question from Unit-V

[**Note:***Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 16 marks either in Section-A or Section-B covering all the five units in the syllabus*]

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SUBJECT EXPERTS

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Govt. Degree College,
Ananthapuram

SYLLABUS VETTED BY

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ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

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REVISED SYLLABUS OF B.Sc (Chemistry)

UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

PROGRAMME: THREE-YEAR B.Sc. (B.Sc Chemistry)

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Q.P.)

For Fifteen Courses of 1, 2, 3 & 4 Semesters)

(To be Implemented from 2020-21 Academic Year)

Andhra Pradesh State Council of Higher Education

B.Sc. Chemistry Revised Syllabus under CBCS

w.e.f. 2020-21

Structure of Chemistry Core Syllabus under CBCS

YEAR	SEMESTER	COURSE	TITLE	MARKS	CREDITS
I	I	I	Inorganic and Physical Chemistry	100	03
			Practical – I Analysis of SALT MIXTURE	50	02
	II	II	Organic and General Chemistry	100	03
			Practical – IIVolumetric Analysis	50	02
II	III	III	Organic Chemistry and Spectroscopy	100	03
			Practical – IIIOrganic preparations and IR Spectral Analysis	50	02
	IV	IV	Inorganic, Organic and Physical Chemistry	100	03
			Practical – IVOrganic Qualitative analysis	50	02
		V	Inorganic and Physical Chemistry	100	02
			Practical-V Course Conductometric and Potentiometric Titrimetry	50	02

SEMESTER – I

Course I (Inorganic &Physical Chemistry) 60 hrs. (4h/w)

Course outcomes:

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

1. Understand the basic concepts of p-block elements
2. Explainthe differencebetweensolid,liquidandgasesintermsof intermolecularinteractions.
3. Applytheconceptsofgasequations,pHandelectrolyteswhilestudyingotherchemistrycourses.

INORGANIC CHEMISTRY 24 h

UNIT –I

Chemistry of p-block elements 8h

Group 13: Preparation & structure of Diborane, Borazine

Group 14: Preparation, classification and uses of silicones

Group 15: Preparation & structures of Phosphonitrilic halides $\{(PNCl_2)_n$ where n=3, 4

Group 16: Oxides and Oxoacids of Sulphur (structures only)

Group 17: Pseudohalogens, Structures of Interhalogen compounds.

UNIT-II

1. Chemistry of d-block elements: 6h

Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states.

2. Chemistry of f-block elements: 6h

Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

3. Theories of bonding in metals: 4h

Valence bond theory andFree electron theory, explanation of thermal and electrical conductivity of metals based on these theories, Band theory- formation of bands, explanation of conductors, semiconductors and insulators.

PHYSICAL CHEMISTRY 36h

UNIT-III

Solidstate 10h

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

UNIT-IV

1. Gaseous state 6h

van der 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. Lawof corresponding states. Joule- Thomson effect. Inversion temperature.

2.Liquid state 4h

Liquid crystals,mesomorphicstate. Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices.

UNIT-V

Solutions, Ionic equilibrium& dilute solutions

1. Solutions 6h

Azeotropes-HCl-H_2O system and ethanol-water system. Partially miscible liquids-phenol-water system. Critical solution temperature (CST), Effect of impurity on consulate temperature. Immiscible liquids and steam distillation.Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

2. **Ionic equilibrium 3h**

Ionic product, common ion effect, solubility and solubility product. Calculations based on solubility product.

3. Dilute solutions 7h

Colligative properties- RLVP, Osmotic pressure, Elevation in boing point and depression in freezing point. Experimental methods for the determination of molar mass of a non-volatile

solute using osmotic pressure, Elevation in boing point and depression in freezing point. Abnormal colligative properties. Van't Hoff factor.

Co-curricular activities and Assessment Methods

1. ContinuousEvaluation:Monitoringtheprogressof student'slearning
2. ClassTests,WorksheetsandQuizzes
3. Presentations,ProjectsandAssignmentsandGroupDiscussions:Enhancescriticalthinking skillsand personality
4. Semester-endExamination:criticalindicatorofstudent'slearningandteachingmethodsadoptedby teachersthroughoutthesemester.

List of Reference Books

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Advanced physical chemistry by Bahl and Tuli
6. Inorganic Chemistry by J.E.Huheey
7. Basic Inorganic Chemistry by Cotton and Wilkinson
8. A textbook of qualitative inorganic analysis by A.I. Vogel
9. Atkins,P.W.&Paula,J.deAtkin'sPhysicalChemistryEd.,OxfordUniversityPress 10thEd(2014).
10. Castellan,G.W.PhysicalChemistry4thEd.Narosa(2004).
11. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).
12. Barrow,G.M.PhysicalChemistry

LABORATORY COURSE -I **30**hrs (2 h / w)

Practical-I Analysis of SALT MIXTURE

(At the end of Semester-I)

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

Course outcomes:

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

1. Understand the basic concepts of qualitative analysis of inorganic mixture
2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
3. Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

Analysis of SALT MIXTURE **50 M**

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

Cations: Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Potassium and Ammonium.

MODEL PAPER

FIRST YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-I

CHEMISTRY Course-I: INORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours Maximum Marks: 75

PART- A5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Explain the preparation & structures of Phosphonitrilic compounds.
2. Explain in brief, catalytic properties & stability of various oxidation states of d-block elements.
3. Write short note on Bravais lattices and crystal systems.
4. What are Smectic&Nematic liquid Crystals? Explain.

5. Write account on Common ion effect & Solubility product.
6. Describe Andrew's isotherms of carbon dioxide.
7. Explain Actinide Constraction.
8. Explain the structure of Borazine.

PART- B5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). Explain Classification, Preparations & uses of Silicones

(or)

(b). (i) What are Pseudohalogens.
(ii) Explain the Structures of any one AX3& AX_5interhalogen compounds.

10 (a). What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.

(or)

(b). (i) Explain the magnetic properties of d- block elements.
(ii) Explain about Conductors, Semi-Conductors& Insulators using Band Theory.

11.(a). Write an essay on Crystal defects.

(or)

(b). What is Bragg's Law. Explain the determination of structure of a crystal by powder method.

12.(a). Derive the relationship between Critical constants &Vanderwaal constants

(or)

(b). (i) Write any 5 differences between liquid crystals & liquids, solids
(ii) Write the applications of Liquid crystals.

13.(a). Explain Nernst distribution Law. Explain its applications

(or)

(b). What are colligative properties. Write experimental methods for determination of molar mass of a non-volatile solute by using Elevation in boiling point & depression in freezing point.

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SEMESTER – II

Course II – (Organic & General Chemistry) 60 hrs (4h/w)

Course outcomes:

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

1. Understandandexplainthedifferentialbehaviorof organiccompoundsbasedonfundamental conceptslearnt.
2. Formulatethemechanismoforganicreactionsby recallingandcorrelatingthefundamentalproperties ofthereactantsinvolved.
3. LearnandidentifymanyorganicreactionmechanismsincludingFreeRadical Substitution, Electrophilic AdditionandElectrophilicAromaticSubstitution.
4. Correlateanddescribethestereochemicalpropertiesoforganiccompoundsand reactions.

ORGANIC CHEMISTRY **36h**

UNIT-I

RecapitulationofBasicsofOrganicChemistry

Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes) **12h**

General methods of preparation of alkanes- Wurtz and WurtzFittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties, Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. 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-II

Carbon-CarbonpiBonds(AlkenesandAlkynes) **12h**

Generalmethodsofpreparation,physicaland chemicalproperties.Mechanism ofE1,E2,E1cbreactions,SaytzeffandHoffmanneliminations, Electrophilic Additions,mechanism(Markownikoff/Antimarkownikoff addition) with suitableexamples,,*syn*and*anti*-addition;additionofH_2,X_2, HX. oxymercuration-

demercuration, hydroboration-oxidation,ozonolysis,hydroxylation, Diels Alderreaction,1,2-and1,4-additionreactionsinconjugateddienes.

Reactionsofalkynes;acidity,electrophilic andnucleophilicadditions,hydrationtoformcarbonyl compounds,Alkylationof terminalalkynes.

UNIT-III

Benzene and its reactivity 12h

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropyliumcation)

Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel- Craft's alkylation and acylation. 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

(Explanation by taking minimum of one example from each type)

GENERAL CHEMISTRY 24 h

UNIT-IV

1. Surface chemistry and chemical bonding

Surface chemistry 6h

Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids,Protection of Colloids, Gold number.

Adsorption-Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.

2. Chemical Bonding 6h

Valence bond theory, hybridization, VB theory as applied toClF_3**,**$Ni(CO)_4$**,** 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).

3. HSAB **2h**

Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.

UNIT-V

Stereochemistry of carbon compounds **10h**

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.

D,L, R,S and E,Z- configuration with examples.

Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)

Co-curricular activities and Assessment Methods

ContinuousEvaluation:Monitoringtheprogressof student'slearning

ClassTests,WorksheetsandQuizzes

Presentations,ProjectsandAssignmentsandGroupDiscussions:Enhancescriticalthinkingskillsand personality

Semester-endExamination:criticalindicatorofstudent'slearningandteachingmethodsadoptedby teachersthroughoutthesemester.

List of Reference Books

Theory:

Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).

Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.

Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

Practical:

Ahluwalia, V.K. &Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
Ahluwalia, V.K. &Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

Additional Resources:

Solomons, T. W. G.; Fryhle, C. B. &Snyder, S. A. Organic Chemistry, 12th Edition, Wiley.
Bruice, P. Y. Organic Chemistry, Eighth Edition, Pearson.
Clayden, J.; Greeves, N.&Warren, S. Organic Chemistry, Oxford.
Nasipuri, D. Stereochemistry of Organic Compounds: Principles and Applications, Third Edition, NewAge International.
Gunstone, F. D. Guidebook to Stereochemistry, Prentice Hall Press, 1975.

LABORATORY COURSE-II **30**hrs (2 h / w)

Practical-II Volumetric Analysis

(At the end of Semester-II)

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. Understandandexplainthevolumetric analysisbasedonfundamental conceptslearnt in ionic equilibria
3. Learnandidentifythe concepts of a standard solutions, primary and secondary standards
4. Facilitate the learner to make solutions of various molar concentrations. This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

Volumetric analysis **50 M**

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of Fe (II) using $KMnO_4$ with oxalic acid as primary standard.

3. Determination of Cu (II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.

4. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$

MODEL PAPER

FIRST YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-II

CHEMISTRY COURSE -II: ORGANIC & GENERAL CHEMISTRY

Time: 3 hours Maximum Marks: 75

PART- A 5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Write different conformations of n-butane. Explain their relative stability..
2. Explain 1,2- & 1,4- addition reactions of conjugated dienes.
3. Explain the orientation effect of halogens on mono substituted benzene.
4. Explain the mechanism of $E1^{CB}$ elimination reaction.
5. Explain the structure of ClF_3 by Valency Bond theory.
6. What are Hard & soft acids & bases? Explain with examples.
7. Draw the Wedge, Fischer, Newmann& saw-Horse representations for Tartaric acid.
8. Define Enantiomers and Diastereomers and give two examples for each.

PART- B 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). (i) Write the preparation of alkanes by Wurtz and Corey-House reaction.
(ii) Explain Halogenation of alkanes. Explain the reactivity and selectivity in free radical substitutions.

(or)

(b). (i) Explain Baeyer Strain Theory
(ii) Draw the conformations of Cyclohexane and explain their stability by drawing energy profile diagram.

10 (a). (i) Write any two methods of preparation of alkenes.
(ii) Explain the mechanism of Markownikiff and Anti-Markownikoff addition of HBr to alkene.

(or)

(b). (i) Explain the acidity of 1-alkynes
(ii) How will you prepare acetaldehyde and acetone from alkynes?
(iii) Write alkylation reaction of terminal alkne.

11.(a). Define Huckel rule of aromatic compounds. What are benzenoid and non-benzenoid aromatic compounds? Give examples.

(or)

(b). Explain the mechanisms of Nitration and Friedel-Craft's alkylation of Benzene.

12.(a). (i) Define Hardy-Schulze rule & Gold number.
(ii) Differentiate Physisorption& Chemisorption. Explain Langmuir adsorption isotherm.

(or)

(b). Construct the Molecular Orbital diagram for O_2 and NO and explain their bond order and magnetic property.

13.(a). Define racemic mixture. Explain any two techniques for resolution of racemic mixture.

(or)

(b). (i) Define Optical activity and Specific rotation.
(ii) Draw the R- & S- isomers of Alanine, Glyceraldehyde.
(iii) Write the E- & Z- isomers of 2-butene.

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SEMESTER - III

Course III (ORGANICCHEMISTRY&SPECTROSCOPY) 60hrs (4 h / w)

Course outcomes:

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

1. Understandpreparation,propertiesandreactionsofhaloalkanes,haloarenesand oxygencontaining functionalgroups.
2. Usethesyntheticchemistrylearntinthiscoursetodofunctionalgroup transformations.
3. Toproposeplausiblemechanismsforanyrelevantreaction

ORGANIC CHEMISTRY **34h**

UNIT – I

1. ChemistryofHalogenatedHydrocarbons: **6h**

Alkylhalides:Methodsofpreparationandproperties,nucleophilicsubstitutionreactions–S_N1,$S_N2$and$S_Ni$mechanismswithstereochemicalaspectsandeffectofsolventetc.;nucleophilicsubstitutionvs.elimination, Williamson's synthesis.

Arylhalides:Preparation(includingpreparationfromdiazoniumsalts)andproperties,nucleophilic aromatic substitution;S_NAr,Benzynemechanism.

Relativereactivityofalkyl,allyl,benzyl,vinylandarylhalidestowardsnucleophilicsubstitution reactions.

2. Alcohols &Phenols **6h**

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, BouvaeltBlanc Reduction; Oxidationofdiolsbyperiodicacidandleadtetra acetate,Pinacol-Pinacolonerearrangement;

Phenols:Preparationandproperties;Acidityandfactorseffectingit, Ringsubstitution reactions, Reimer–Tiemannand Kolbe's–Schmidt Reactions, Fries and Claisenrearrangements with mechanism;

UNIT-II

CarbonylCompounds **10h**

Structure,reactivity,preparationandproperties;

Nucleophilicadditions,Nucleophilicaddition-eliminationreactionswithammoniaderivatives MechanismsofAldolandBenzoincondensation, Claisan-Schmidt, Perkin, CannizzaroandWittigreaction,Beckmannhaloformreactionand BaeyerVilligeroxidation,α-substitutionreactions,oxidationsandreductions(Clemmensen, wolf –kishner, with $LiAlH_4$ &$NaBH_4$).

Additionreactionsof α,β-unsaturatedcarbonylcompounds:Michaeladdition.

Activemethylenecompounds: Keto-enoltautomerism.Preparationandsyntheticapplicationsofdiethyl malonateandethylacetoacetate.

UNIT-III

CarboxylicAcidsand their Derivatives **12h**

General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of substituentsonacidicstrength.Typicalreactionsofdicarboxylicacids,hydroxyacidsandunsaturatedacids.

Preparationandreactionsofacidchlorides,anhydrides,estersandamides;

Comparativestudyofnucleophilicsubstitutionatacylgroup-Mechanism ofacidicandalkalinehydrolysisof esters,Claisencondensation,Reformatskyreactions and Curtiusrearrangement

Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction.

SPECTROSCOPY **26 h**

UNIT-IV

MolecularSpectroscopy: **18h**

Interactionofelectromagneticradiationwithmoleculesandvarioustypesof spectra;

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrationalspectroscopy: Classicalequationofvibration, computationofforceconstant, Harmonic and anharmonic oscillator, Morsepotential curve,vibrational degreesoffreedom forpolyatomic molecules, modesofvibration. Selection rules for vibrational transitions, Fundamentalfrequencies, overtones and hotbands.

Electronic spectroscopy: Energy levels of molecular orbitals (σ, π, n). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore. bathochromic and hypsochromic shifts.Beer-Lambert's law and its limitations.

Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

UNIT-V **8h**

Application of Spectroscopy to Simple Organic Molecules

Application of visible, ultraviolet and Infrared spectroscopy in organic molecules.

Application of electronic spectroscopy and Woodward rules for calculating λ_{max} of conjugated dienes and α,β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Co-curricular activities and Assessment Methods

ContinuousEvaluation:Monitoringtheprogressof student'slearning

ClassTests,WorksheetsandQuizzes

Presentations,ProjectsandAssignmentsandGroupDiscussions:Enhancescriticalthinkingskillsand personality

Semester-endExamination:criticalindicatorofstudent'slearningandteachingmethodsadoptedby teachersthroughoutthesemester.

List of Reference Books

1. A Text Book of Organic Chemistry by Bahl and Arunbahl
2. A Text Book of Organic chemistry by I L FinarVol I
3. Organic chemistry by Bruice
4. Organic chemistry by Clayden
5. Spectroscopy by William Kemp
6. Spectroscopy by Pavia
7. Organic Spectroscopy by J. R. Dyer
8. Elementary organic spectroscopy by Y.R. Sharma
9. Spectroscopy by P.S.Kalsi
10. Spectrometric Identification of Organic Compounds by Robert M Silverstein, Francis X Webster
11. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
12. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. &Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012)

13. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).

LABORATORY COURSE -III 30hrs (2 h / w)

Practical Course-IIIOrganic preparations and IR Spectral Analysis

(At the end of Semester- III)

Course outcomes:

Onthecompletionofthecourse,thestudentwillbe abletodothefollowing**:**

1. how to use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. how to calculate limiting reagent, theoretical yield, and percent yield
3. how to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately
4. how to dispose of chemicals in a safe and responsible manner
5. how to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
6. how to create and carry out work up and separation procedures
7. how to critically evaluate data collected to determine the identity, purity, and percent yield of products and to summarize findings in writing in a clear and concise manner

Organic preparations: 40M

i. Acetylation of one of the following compounds:

amines (aniline, o-, m-, ptoluidines and o-, m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) by any one method:

a. Using conventional method.

b. Using green approach

ii. Benzolyation of one of the following amines

(aniline, o-, m-, p- toluidines and o-, m-, p-anisidine)

iii. Nitration of any one of the following:

a. Acetanilide/nitrobenzene by conventional method

b. Salicylic acid by green approach (using ceric ammonium nitrate).

IR Spectral Analysis **10M**

IR Spectral Analysis of the following functional groups with examples

a) Hydroxyl groups

b) Carbonyl groups

c) Amino groups

d) Aromatic groups

MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-III

CHEMISTRY COURSE-III: ORGANIC CHEMISTRY & SPECTROSCOPY

Time: 3 hours Maximum Marks: 75

PART- A 5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Discuss two methods for preparation of aryl halides.
2. Explain the mechanism for Pinacol-Pinacolone rearrangement.
3. Discuss the mechanism for Bayer-villiger oxidation reaction.
4. Explain the effect of substituents on acidic strength of mono-carboxylic acids.
5. Write the mechanism for Claisen Condensation reaction.
6. Write the selection rules in rotational spectroscopy.
7. Explain Spin – Spin coupling and Coupling Constant.
8. Explain types of electronic transitions in UV spectroscopy.

PART- B 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). Give the mechanism & stereochemistry of SN^1& SN^2 reactions of alkyl halides with suitable example.

(or)

(b). Explain the following reactions with mechanism.
(i) Reimer-Tiemann reaction (ii) Fries rearrangement.

10 (a). Discuss the mechanism for following reactions.
(i) Perkin reaction. (ii) Cannizaro reaction

(or)

(b). Write the preparation and any three synthetic applications of diethyl malonate.

11.(a). Explain acid and base hydrolysis reaction of esters with mechanism.

(or)

(b). Explain the mechanisms of Curtius rearrangement & Arndt –Eistert reaction.

12.(a). (i) Write a note on vibrational degrees of freedom for polyatomic molecules.
(ii) Explain different modes of vibrations & selection rules in IR spectroscopy.

(or)

(b). (i) Define Bathochromic shift. Explain the effect of conjugation in U.V. spectroscopy.
(ii) Discuss the principle of NMR spectroscopy.

13.(a). Write Woodward-Fieser rules for calculating λmax for conjugated dienes and α,β – unsaturated carbonyl compounds , and apply them for one example each.

(or)

(b). (i) What is Fingerprint region. Explain its signigicance with an example.(ii) Write IR spectral data for any one alcohol, aldehyde and ketone

SEMESTER - IV

Course IV (INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY) 60hrs (4 h / w)

Course outcomes:

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

1. Tolearnaboutthelawsofabsorptionoflightenergybymoleculesandthesubsequentphotochemical reactions.
2. Tounderstandtheconceptofquantumefficiencyandmechanismsofphotochemicalreactions.

UNIT - I

OrganometallicCompounds **8h**

Definitionandclassification oforganometallic compoundsonthebasisofbondtype,Conceptofhapticityof organicligands.Metalcarbonyls:18electronrule,electroncountofmononuclear, polynuclearandsubstituted metalcarbonylsof3dseries.Generalmethodsofpreparationofmonoandbinuclearcarbonylsof 3d series.P-acceptor behaviour of carbon monoxide. Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies).

UNIT – II

Carbohydrates 8h

Occurrence,classificationandtheirbiologicalimportance,Monosaccharides: Constitutionandabsolute configurationofglucoseandfructose,epimersandanomers,mutarotation,determinationofringsiz eofglucose andfructose,Haworthprojectionsandconformationalstructures;Interconversions ofaldosesandketoses; Killiani-FischersynthesisandRuffdegradation; Disaccharides– Elementarytreatmentofmaltose, lactoseand sucrose.Polysaccharides–Elementarytreatmentof starch.

UNIT- III

Amino acids and proteins 6h

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating- peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

Heterocyclic Compounds 7h

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds, Paul-Knorr synthesis.

Properties: Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

UNIT- IV

NitrogenContainingFunctionalGroups

Preparation, propertiesandimportantreactionsof nitrocompounds,aminesanddiazoniumsalts.

1. Nitro hydrocarbons 3h

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

2.Amines: 11h

Introduction,classification,chiralityin amines (pyramidal inversion),importanceand generalmethodsofpreparation.

Properties : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. DistinctionbetweenPrimary, secondaryandtertiaryaminesusingHinsberg'smethodandnitrousacid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimidesynthesis,Hoffmann-Bromamidereaction,Carbylaminereaction,Mannichreaction,Hoffmann'sexhaustive methylation,Hofmann-eliminationreactionandCopeelimination.

Diazonium Salts:Preparationand syntheticapplicationsofdiazoniumsaltsincludingpreparationofarenes, haloarenes, phenols,cyanoandnitrocompounds. Couplingreactionsofdiazoniumsalts (preparationofazo dyes).

UNIT- V

Photochemistry 5h

Difference between thermal and photochemical processes, Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).

Thermodynamics **12 h**

The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoff s equation, Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non- spontaneous processes, Helmholtz and Gibbs energies-Criteria for spontaneity.

Co-curricular activities and Assessment Methods

ContinuousEvaluation:Monitoringtheprogressof student'slearning

ClassTests,WorksheetsandQuizzes

Presentations,ProjectsandAssignmentsandGroupDiscussions:Enhancescriticalthinkingskillsand personality

Semester-endExamination:criticalindicatorofstudent'slearningandteachingmethodsadoptedby teachersthroughoutthesemester.

List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, Purdue Univ
4. Text book of physical chemistry by S Glasstone
6. Concise Inorganic Chemistry by J.D.Lee
7. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
8. A Text Book of Organic Chemistry by Bahl and Arunbahl
9. A Text Book of Organic chemistry by I L FinarVol I
10. A Text Book of Organic chemistry by I L FinarVol II
11. Advanced physical chemistry by Gurudeep Raj

LABORATORY COURSE -IV 30hrs(2 h / w)

Practical Course-IVOrganic Qualitative analysis **50 M**

(At the end of Semester- IV)

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. Determine melting and boiling points of organic compounds
3. Understandtheapplication of concepts of different organic reactions studied in theory part of organic chemistry

Organic Qualitative analysis **50 M**

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

MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV

CHEMISTRY COURSE -IV: INORGANIC, ORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours Maximum Marks: 75

PART- A 5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.
2. What are epimers and anomers. Give examples.
3. Discuss about iso electric point and zwitter ion.
4. Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds.
5. Explain Tautomerism shown by nitro alkanes
6. Discuss the basic nature of amines.
7. Write the differences between thermal and photochemical reactions.
8. Derive heat capacities and derive $C_p - C_v = R$

PART- B 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples.

(or)

(b). Discuss the general methods of preparations of mono & bi-nuclear carbonyls of 3d series.

10 (a). Discuss the constitution, configuration and ring size of glucose. Draw the Haworth and Conformational structure of glucose.

(or)

(b). (i) Explain Ruff's degradation.
(ii) Explain Kiliani- Fischer synthesis.

11.(a). What are amino acids? Write any three general methods of preparation of amino acids.

(or)

(b). Discuss the aromatic character of Furan, Thiophene and Pyrrole.

12.(a). Write the mechanism for the following.
(i) Nef reaction (ii) Mannich reaction

(or)

(b).(i) Explain Hinsberg separation of amines.
(ii) Discuss any three synthetic applications of diazonium salts.

13.(a). What is quantum yield? Explain the photochemical combination of Hydrogen-Chlorine and Hydrogen - Bromine.

(or)

(b). Define entropy. Describe entropy changes in the reversible and irreversible process.

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SEMESTER - IV

CourseV(INORGANIC &PHYSICAL CHEMISTRY) 60 hrs (4 h / w)

Course outcomes:

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

1. Understand concepts ofboundaryconditionsandquantization,probabilitydistribution,mostprobablevalues, uncertainty andexpectationvalues
2. Applicationofquantizationtospectroscopy.
3. Varioustypesofspectraandtheiruseinstructuredetermination.

INORGANIC CHEMISTRY 26 h

UNIT –I

Coordination Chemistry 12 h

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectrochemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of octahedral geometry,Jahn-Teller distortion, square planar coordination.

UNIT –II

1. InorganicReactionMechanism: **4h**

Introductiontoinorganicreactionmechanisms.Conceptofreaction pathways,transitionstate,intermediateand activatedcomplex. Labile and inert complexes, ligand substitution reactions - SN^1 and SN^2,Substitutionreactionsinsquare planar complexes,Trans-effect,theoriesoftranseffect and its applications

2. Stability of metal complexes: 2h

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

BioinorganicChemistry: 8h

Metalionspresentinbiologicalsystems,classificationofelementsaccordingtotheiractioninbiological system.Geochemical effectonthedistributionofmetals,Sodium/K-pump,carbonicanhydraseand carboxypeptidase.

Excessanddeficiencyofsometracemetals.Toxicityofmetalions(Hg,Pb,CdandAs), reasonsfortoxicity,Useof chelatingagentsinmedicine,Cisplatinasananti-cancerdrug. Ironanditsapplicationinbio-systems,Haemoglobin,Myoglobin.Storageandtransferof iron.

PHYSICAL CHEMISTRY 34 h

UNIT-III

1 .Phase rule

6hConcept of phase, components, degrees of freedom. Thermodynamic derivation of 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-IV

Electrochemistry 14h

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes,Kohlrausch's law and its applications, Definition of transport number,determination of transport number by Hittorf's method. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conductometric titrations.

Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal-metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements - Potentiometric titrations.

Fuel cells- Basic concepts, examples and applications

UNIT-V

ChemicalKinetics: 14 h

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 (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. 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.

Co-curricular activities and Assessment Methods

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3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
4. Advanced physical chemistry by Gurudeep Raj
5. Principles of physical chemistry by Prutton and Marron
6. Advanced physical chemistry by Bahl and Tuli
7. Inorganic Chemistry by J.E.Huheey
8. Basic Inorganic Chemistry by Cotton and Wilkinson
9. A textbook of qualitative inorganic analysis by A.I. Vogel
10. Atkins,P.W.&Paula,J.deAtkin'sPhysicalChemistryEd.,OxfordUniversityPress 10thEd(2014).
11. Castellan,G.W.PhysicalChemistry4thEd.Narosa(2004).
12. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).
13. Barrow,G.M.PhysicalChemistry

SEMESTER - IV

CourseV **LABORATORY COURSE** **30**hrs (2 h / w)

Practical-Course -VConductometric and Potentiometric Titrimetry **50 M**

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 conceptsof electrochemistry in experiments
3. Be familiar with electroanalytical methods and techniques in analytical chemistry which study an analyte by measuring the potential (volts) and/or current (amperes) in an electrochemical cell containing the analyte

Conductometric and Potentiometric Titrimetry 50 M

1. **Conductometric titration**- Determination of concentration of HCl solution using standard NaOH solution.
2. **Conductometric titration**- Determination of concentration of CH_3COOH Solution using standard NaOH solution.
3. **Conductometric titration**- Determination of concentration of CH_3COOH and HCl in a mixture using standard NaOH solution.
4. **Potentiometric titration**- Determination of Fe (II) using standard $K_2Cr_2O_7$ solution.
5. Determination of rate constant for acid catalyzed ester hydrolysis.

MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV

CHEMISTRY COURSE V: INORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours Maximum Marks: 75

PART- A5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Write note on Jahn-Teller distortion.
2. Explain Labile & inert complexes.
3. Explain Job's method for determination of composition of complex.
4. Explain Thermodynamic derivation of Gibb's phase rule.
5. Explain any two conductometric titrations.
6. Write note on Fuel Cells with examples and applications.
7. What is enzyme catalysis? Write any three factors effecting enzyme catalysis.

8. Derive Michaels- Menten equation.

PART- B 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT.

(or)

(b). Define CFSE. Explain the factors effecting the magnitude of crystal field splitting energy.

10 (a). Explain Trans effect. Explain the theories of trans effect and write any two applications of trans effect.

(or)

(b). (i) Write the biological functions of Haemoglobin and Myoglobin.
(ii) Write note on use of chelating agents in medicines.

11.(a). Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.

(or)

(b). (i) Explain phase diagram for NaCl-water system.
(ii) Explain briefly about Freezing mixtures.

12.(a). Define Transport number. Write experimental method for the determination of transport number by Hittorf method.

(or)

(b). (i) Define single electrode potential.
(ii) Explain four types of electrodes with examples.

13.(a). Explain general methods for determination of order of a reaction.

(or)

(b). Explain Collision theory and Activated complex theory of bimolecular reactions.

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SUBJECT EXPERTS

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