Department of Home Science

Mapping of course outcomes with learning outcomes

2021-2022

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
SEMESTER-I **101-Basic Nutrition**	CO1. Understand the role of macro and micronutrients their composition, functions, digestion and absorption in the body.	Introduction to nutrition and physiology of macro nutrients	Q1-Knowledge of nutrients and application of the knowledge in their lives
	CO2. Learn fat and water soluble vitamins, minerals, functions, digestion, dietary sources and absorption.	Physiology of fat and water soluble vitamins.	Q2-Analysis and comparison of water and fat soluble vitamins.
	CO3. Understand the physiology of minerals.	Physiology of micro and macro minerals.	Q3-Understanding and Evaluation.
	CO4. Recognize the factors affecting	Energy Metabolism	Q4-Knowledge, application and Evaluation

	Basal Metabolic Rate.		
	CO5. Learn basic mechanism of water balance and understand the interrelationship between nutrients.	Importance of water and interrelationship between nutrients	Q5- Knowledge, comparison, understanding, analysis and application.
102- Fundamentals of Textiles	CO1. Know the importance of study of textiles.	Introduction to Textiles and Clothing	Q1- Knowledge, compare, evaluate
	CO2. Understand the production of properties of natural fibres.	Natural Fibres	Q2- Knowledge, compare, organize, analysis
	CO3. Acquire the knowledge of production and properties of man made fibres.	Manmade Fibres	Q3- Knowledge, organize, application, analysis
	CO4. Learn the concepts of mineral fibres	Mineral Fibres	Q4- Knowledge, analysis, relate, compare
	CO5. Gain knowledge of yarns and spinning	Yarns	Q5- Knowledge, analysis, compare, apply, evaluate

103-General Psychology	CO1. Develop ability to investigate methods of understanding human behavior.	Psychology as a science of behaviour	Q1- Knowledge, analysis, comparison, evaluation
	CO2. Execute the principles of perceptual organization and constancies in real life situations. Understand efficient methods of learning procedures.	Perception and Attention	Q2- Knowledge, comparison, application, analysis.
	CO3. Explain motivational factors that influence a person in reaching the desired goal. Recognizes adaptive and disruptive emotions.	Learning and remembering	Q3- Knowledge, comparison, evaluation, application.
	CO4. Demonstrate the testing procedures of intelligence and identify verbal and non-verbal tests.	Motivation and Emotions	Q4-Knowledge, analysis, comparison, evaluation, application
	CO5. Differentiate between normal and abnormal personalities and assessing the	Intelligence, aptitude and meta-cognition	

	personality of a person.		
SEMESTER-II **201-Introduction To Food Science**	CO1. Understand objectives and functions of food, ICMR food group classification. Understand nutritive value of pulses, millets and legumes.	Functions of food	Q1- Knowledge, comparison, analysis, Drawing skill.
	CO2. Learn nutritive value of nuts, spices and condiments	Nutritive value of Nuts, spices and condiments	Q2- Knowledge, analysis, application
	CO3. Identify composition, nutritive value of vegetables and beverages.	Nutritive value of vegetables and Beverages	Q3- Knowledge, application, analysis.
	CO4. Learn milk processing, cooking of meat, nutritive value of fish, egg	Nutritive value of milk, meat, fish and poultry	Q4- Knowledge, comparison, analysis, application
	CO5. Understand food deterioration causes, food additives and Phyto-chemicals.	Food Deterioration and Food Additives.	Q5- Knowledge, Comparison, application, analysis, evaluation
202-Housing for Better Living	CO1. Understand the procedure in selecting a site and factors in planning different rooms in house	House and Housing needs	Q1- Knowledge, analysis, relate, evaluate, apply.

	CO2. Effectively plan for work centers and storage areas in house	Work centers and Storage areas in Home	Q2-Knowledge, analysis, apply, relate.
	CO3. Interpret elements and principles of art and color harmony.	Elements of Art	Q3- knowledge, analysis, compare, apply.
	CO4. Explain different types of kitchen plans, House plans for diverse income groups.	House plans Kitchen Plans	Q4- Knowledge, apply, compare, analysis.
	CO5. Acquire different types of flower arrangements, lighting accessories and furniture.	Flower Arrangement	Q5-Knowledge, apply, compare, analysis, evaluate.
303- Fundamentals of Home Science Extension	CO1. Acquire knowledge about characteristics and principles of extension education.	Education	Q1-knowledge, application, analysis, synthesis
	CO2. Understand adult psychology, motivation and learning	Adult Psychology	Q2-knowledge, application, analysis, synthesis, compare
	CO3. Educate principles, elements and importance of	Elements of Communication	Q3-knowledge, application, analysis, synthesis

	communication in extension education.		
	CO4. Give insight into various teaching aids used in extension education.	Audio-visual aids	Q4-knowledge, application, analysis, synthesis, relate, compare
	CO5. Explain characteristics of urban, rural and tribal communities.	Community development	Q5-knowledge, application, analysis, synthesis, compare
SEMESTER-III **301-Community Nutrition**	CO1. Implement anthropometry in assessing nutritional status.	Nutritional Assessment	Q1-Knowledge, application, analysis, evaluate
	CO2. Well equipped with the concepts related to examine clinical signs in assessing the nutritional status	Clinical Assessment	Q2- Relate, Schedule, analyze, prepare, measure
	CO3. Understand the benefits of Dietary assessment.	Dietary Assessment	Q3- Record, identify, interpretation, construct, evaluate and compare.
	CO4. Attain knowledge about National and International programs related to nutrition.	Nutritional Programs	Q4- List, discuss, apply, compare, evaluate, prepare.

	CO5. Explain the advantages of nutrients in preventing prevalent nutritional problems in India.	Nutritional Problems	Q5-Discuss, application, organize, compare, evaluate
302-Principles of Garment Construction	CO1. Know the importance of study of garment construction.	Introduction to Principles of garment construction.	Q1- Knowledge, compare, evaluate
	CO2. Understand the principles of Sewing machine.	Sewing machine	Q2- Knowledge, compare, organize, analysis
	CO3. Acquire the knowledge of pattern making	Patterns	Q3- Knowledge, organize, application, analysis
	CO4. Learn the concepts of parts of garments	Parts of garments	Q4- Knowledge, analysis, relate, compare
	CO5. Gain knowledge of drafting of garments	Types of garments	Q5- Knowledge, analysis, compare, apply, evaluate
303-Child Development	CO1. Understand the concepts of growth and development .	Growth and Development	Q1-Knowledge, analyze, evaluate

	CO2 . Attain Knowledge about prenatal stages and hazards during pregnancy.	Prenatal Development	Q2-knowledge, discuss, analyze, compare
	CO3. Analyze subdivisions and characteristics of an infant.	infancy	Q3-analyze, compare, describe, evaluate
	CO4 . Appraise the holistic development of early childhood. Interpret the needs of special children.	Early childhood	Q4-Knowledge, compare, describe, evaluate.
	CO5 . Differentiate the developmental tasks of childhood and adolescence. Learn about the adjustment problems during adolescence	Adolescence	Q5-knowledge, analyze, evaluate, compare
SEMESTER-IV **401-Therapeutic Nutrition**	CO1 . Know about different types of diets and plan diets for protein energy Malnutrition .	Principles of Meal Planning	Q1-knowledge, analysis, application
	CO2 . Gain Knowledge on obesity, underweight and fever. Plan diets accordingly.	Diet during Obesity	Q2-knowledge, application, analysis, synthesis
	CO3 . Discuss diseases related to stomach, duodenum	Gastrointestinal Tract Diseases	Q3-knowledge, application, analysis, synthesis

	and intestines and plan diets.		
	CO4. Find the reasons for cardiac and kidney diseases and learn measures for dietary management.	Diet during Cardiovascular diseases	Q4-knowledge, application, analysis, synthesis
	CO5. Understand the causes for Diabetes Mellitus and plan diet using diet principles.	Diet during Diabetes	Q5-knowledge, application, analysis, synthesis
402-Fabric Construction And Apparel Care	CO1. Analyse the methods of application of dyes.	Application of Dyes.	Q1-Knowledge, analyze, evaluate
	CO2 . Gain Knowledge of various methods of printing.	Methods of Printing.	Q2-knowledge, discuss, analyze, compare
	CO3 . Know the concepts of caring of clothes.	Use and care of clothing.	Q3-analyze, compare, describe, evaluate
	CO4 . Study Indian Textiles and Embroidery.	Indian textiles and Embroidery.	Q4-Knowledge, compare, describe, evaluate.
	CO5 . Acquire Knowledge on factors affecting price on fabrics in our country.	Factors affecting Price	Q5-knowledge, analyze, evaluate, compare

403-Human Development	CO1. Understand the concepts of growth and development	Growth and Development	Q1-Knowledge, analyze, evaluate
	CO2 . Attain Knowledge about prenatal stages and hazards during pregnancy.	Prenatal Development	Q2-knowledge, discuss, analyze, compare
	CO3. Analyze subdivisions and characteristics of an infant.	infancy	Q3-analyze, compare, describe, evaluate
	CO4 . Appraise the holistic development of early childhood. Interpret the needs of special children.	Early childhood	Q4-Knowledge, compare, describe, evaluate.
	CO5 . Differentiate the developmental tasks of childhood and adolescence. Learn about the adjustment problems during adolescence	Adolescence	Q5-knowledge, analyze, evaluate, compare
404-BioChemistry	CO1. Understand metabolic processes involved in carbohydrates . learn about the occurrence of diabetes.	Carbohydrates	Q1-Knowledge, Understand, Comparison and Evaluation

	CO2. Learn the value of lipids in the life of human beings.	Lipids	Q2-Understand, analysis, application
	CO3. Understand the metabolism of Proteins	Proteins	Q3-Understanding, Analysis, Application
	CO4. Recognize the significance of enzymes	Enzymes	Q4-Knowledge, Analysis, Comparison, Drawing skills
	CO5. Analyze how duplication occurs in the transmission of genetic characteristics.	Nucleic Acids	Q5- Understand, Comparison, Analysis, Evaluation, Drawing skill.
405- Management of Family Resources	CO1 . Understand the human and non human resources.	Resources	Q1-Knowledge, analyze, compare, discuss
	CO2 . Acquire the Knowledge of management process	Management Process	Q2-Knowledge, analyze, evaluate, synthesis
	CO3 . Analyse values , goals and standards and relate their relationship.	Values, Goals and Standards	Q3-Knowledge, application, analyze, compare
	CO4 . Evaluate role of decision making.	Decision Making	Q4-application, evaluation, analyze, compare

	CO5 . Develop the skills of management	Managerial skills	Q5-knowledge, analyze, application, compare
406-Home Science Extension and Education	CO1. Acquire knowledge about characteristics and principles of extension education.	Education	Q1-knowledge, application, analysis, synthesis
	CO2. Understand adult psychology, motivation and learning	Adult Psychology	Q2-knowledge, application, analysis, synthesis, compare
	CO3. Educate principles, elements and importance of communication in extension education.	Elements of Communication	Q3-knowledge, application, analysis, synthesis
	CO4. Give insight into various teaching aids used in extension education.	Audio-visual aids	Q4-knowledge, application, analysis, synthesis, relate, compare
	CO5. Explain characteristics of urban, rural and tribal communities.	Community development	Q5-knowledge, application, analysis, synthesis, compare
SEMESTER-V	CO1. Understand the relation of sociology to other sciences and various social institutions like	Sociology and Social Institutions	Q1- Knowledge, discuss, compare, analyze

501-Sociology, Marriage& Family Dynamics	family, marriage and religion.		
	CO2. Identify different social groups in society.	Social Groups	Q2-Knowledge, compare, describe, evaluate.
	CO3. Review consequences of planned and unplanned Industrialization and basic amenities in Indian cities.	Industrialization	Q3-Knowledge, apply, evaluate, analyze
	CO4. Explore the current social problems like beggary, prostitution etc.,	Social Problems	Q4. Knowledge, analyze, discuss.
	CO5. Understand the role of individuals and organizations bringing social reforms. Recognise the importance of Indian Constitution and directive principles.	Social Reforms	Q5. Knowledge, analyze, evaluate, discuss
502-Human Development	CO1. Understand the concepts of growth and development	Growth and Development	Q1-Knowledge, analyze, evaluate

	CO2 . Attain Knowledge about prenatal stages and hazards during pregnancy.	Prenatal Development	Q2-knowledge, discuss, analyze, compare
	CO3. Analyze subdivisions and characteristics of an infant.	infancy	Q3-analyze, compare, describe, evaluate
	CO4 . Appraise the holistic development of early childhood. Interpret the needs of special children.	Early childhood	Q4-Knowledge, compare, describe, evaluate.
	CO5 . Differentiate the developmental tasks of childhood and adolescence. Learn about the adjustment problems during adolescence	Adolescence	Q5-knowledge, analyze, evaluate, compare
503-Textiles &Clothing	CO1. Analyse the methods of application of dyes.	Application of Dyes.	Q1-Knowledge, analyze, evaluate
	CO2 . Gain Knowledge of various methods of printing.	Methods of Printing.	Q2-knowledge, discuss, analyze, compare
	CO3 . Know the concepts of caring of clothes.	Use and care of clothing.	Q3-analyze, compare, describe, evaluate

	CO4 . Study Indian Textiles and Embroidery.	Indian textiles and Embroidery.	Q4-Knowledge, compare, describe, evaluate.
	CO5 . Acquire Knowledge on factors affecting price on fabrics in our country.	Factors affecting Price	Q5-knowledge, analyze, evaluate, compare
504-Management of Family Resources	CO1 . Understand the human and non human resources.	Resources	Q1-Knowledge, analyze, compare, discuss
	CO2 . Acquire the Knowledge of management process	Management Process	Q2-Knowledge, analyze, evaluate, synthesis
	CO3 . Analyse values , goals and standards and relate their relationship.	Values, Goals and Standards	Q3-Knowledge, application, analyze, compare
	CO4 . Evaluate role of decision making.	Decision Making	Q4-application, evaluation, analyze, compare
	CO5 . Develop the skills of management	Managerial skills	Q5-knowledge, analyze, application, compare
505-Therapeutic Nutrition	CO1 . Know about different types of diets and plan diets	Principles of Meal Planning	Q1-knowledge, analysis, application

	for protein energy Malnutrition .		
	CO2 . Gain Knowledge on obesity, underweight and fever. Plan diets accordingly.	Diet during Obesity	Q2-knowledge, application, analysis, synthesis
	CO3 . Discuss diseases related to stomach, duodenum and intestines and plan diets.	Gastrointestinal Tract Diseases	Q3-knowledge, application, analysis, synthesis
	CO4. Find the reasons for cardiac and kidney diseases and learn measures for dietary management.	Diet during Cardiovascular diseases	Q4-knowledge, application, analysis, synthesis
	CO5. Understand the causes for Diabetes Mellitus and plan diet using diet principles.	Diet during Diabetes	Q5-knowledge, application, analysis, synthesis
506-Home Science Extension	CO1. Acquire knowledge about characteristics and principles of extension education.	Education	Q1-knowledge, application, analysis, synthesis
	CO2. Understand adult psychology, motivation and learning	Adult Psychology	Q2-knowledge, application, analysis, synthesis, compare

	CO3. Educate principles, elements and importance of communication in extension education.	Elements of Communication	Q3-knowledge, application, analysis, synthesis
	CO4. Give insight into various teaching aids used in extension education.	Audio-visual aids	Q4-knowledge, application, analysis, synthesis, relate, compare
	CO5. Explain characteristics of urban, rural and tribal communities.	Community development	Q5-knowledge, application, analysis, synthesis, compare
SEMESTER-VI **601-Pre-School Education**	CO1. Acquire knowledge on aims and objectives of preschool.	Ideal Nursery school	Q1-knowledge, analysis, compare, application
	CO2. Learn prerequisites of Nursery school	Physical Arrangement of Preschool Building	Q2- knowledge, analysis, compare, application
	CO 3. Explain the stages of play behavior and importance of values of play.	Play Behaviour	Q3-knowledge, analysis, compare, application
	CO4. Formulate a preschool program.	Preschool Program	Q4-knowledge, analysis, compare, application, synthesis

	CO5. Acquire knowledge on activities in a day's program and parental role in preschool education.	Role of parents in Preschool Education	Q5-knowledge, analysis, compare, application, synthesis
602-Child Welfare Organization	CO1. Acquire knowledge on International organizations role for the welfare of children.	International Organisations	Q1-knowledge, analysis, compare, application
	CO2. Acquire knowledge on services providing by the Boards for the welfare of the children.	Services of Indian Red Cross Society	Q2-knowledge, analysis, compare, application
	CO3. Analyze the role of ICDS.	ICDS	Q3-knowledge, analysis, compare, application
	CO4. Acquire knowledge on Child Rights and Acts.	Child Rights	Q4-knowledge, analysis, compare, application
	CO5. Explain the consequences of child abuse.	Child Abuse	Q5-knowledge, analysis, compare, application

Household And Institutional Economics	CO1. Acquire knowledge on basic concepts of Economics.	Basic concepts of Economics	Q1-knowledge, analysis, compare, application
	CO2. Formulate and manage time in daily life.	Time Management	Q2-knowledge, analysis, compare, application, synthesis, relate
	CO3. Acquire knowledge on work simplification techniques and energy management.	Energy Management	Q3-knowledge, analysis, compare, application
	CO4. Acquire knowledge and implement techniques of money management in their daily life.	Money Management	Q4-knowledge, analysis, compare, application
	CO5. Learn about consumer education, laws.	Consumer Education	Q5-knowledge, analysis, compare, application
604-Food Service Management	CO1: Known food service in Institutions and maintaining accounts.	Food Service Institutions	Q1-knowledge, analysis, compare, application

	CO2: Operate the equipment for food preparation and service and maintaining cash books.	Equipment for food preparation.	Q2- knowledge, analysis, compare, application
	CO3: Gain knowledge in food management and food cost control.	Food Cost Control	Q3-knowledge, analysis, compare, application
	CO4: Learn menu planning, sanitation and hygiene in food service.	Sanitation and Hygiene in food service.	Q4-knowledge, analysis, compare, application, synthesis
	CO5: Study the concepts of ventilation, lighting, water supply and personnel management of food service.	Facilities in food service centres.	Q5-knowledge, analysis, compare, application, synthesis
605- Home Science Extension and Community Development	CO1: Acquire Knowledge of program planning and objectives in Extension Education.	Objectives of Extension Education.	Q1-knowledge, analysis, compare, application
	CO2: Perceive the classification of teaching methods-	Teaching Methods.	Q2- knowledge, analysis, compare, application

	criteria for selection of teaching methods.		
	CO3: Give insight for lesson planning for specific group and characteristics in extension education.	Lesson Plan in Extension Education.	Q3-knowledge, analysis, compare, application
	CO4: Establish the contribution of various voluntary organization like DWCRA,ICDS etc.,	Voluntary Organisations.	Q4-knowledge, analysis, compare, application, synthesis
	CO5: Understand the Panchayat Raj system in India.	Panchayat Raj System	Q5-knowledge, analysis, compare, application, synthesis
606-Women Rural & Development	CO1: Analyse the objectives of rural development and learn the characteristics of rural and urban associates.	Objectives of Rural Development.	Q1-knowledge, analysis, compare, application
	CO2: Understand the rural development administration in India and the role of DRDA.	Rural Administration in India.	Q2- knowledge, analysis, compare, application

	CO3: Gain knowledge on rural problems and women role in rural development in India	Rural Problems of Women	Q3-knowledge, analysis, compare, application
	CO4: Acquire knowledge on rural development programs their objectives and achievements and constraints.	Rural Development Programs.	Q4-knowledge, analysis, compare, application, synthesis
	CO5: Know the organization setup of Krishi vignan kendras and community services.	Krishivignan Kendras organisation.	Q5-knowledge, analysis, compare, application, synthesis

D. K. GOVERNMENT COLLEGE FOR WOMEN

Nellore, Andhra Pradesh- 524003

Autonomous College, College with Potential for Excellence

Re-accredited with "A" Grade by NAAC

Department of Botany

Mapping of course outcomes with learning outcomes, 2021-22

Botany – Paper- I : Fundamentals of Microbes and Non Vascular Plants– Semester I

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper- I : Fundamentals of Microbes and Non Vascular Plants	CO1. Classification of many species, old and new, and Understand recent discoveries, origin and evolution of group of viruses, basic cellular functions and disease mechanisms.	Origin of life, Classification of microorganisms, special groups of Viruses- Discovery, Plant diseases caused by viruses.	Q1- Remembering, understanding- Categorizing, Grouping, Examining
	CO2. Understanding Role of bacteria in different fields such as agriculture, industry and impotent diseases.	Bacteria and Eubcteria: Discovery, Economic importance	Q2- Remembering, understanding, Analyzing, Evaluating.
	CO3. Know the systematic morphology, structure and Economic importance of Fungi. Understand the features of Lichens.	FUNGI- Classification, Lichens Structure, and reproduction, ecological and economic importance.	Q3-Remembering, understanding- Examining and Categorizing
	CO4. Understand the diversity of Algae, defferent systems of classification of algae.	Fritsch classification of Algae, economic importance	Q4- Remembering, understanding- Examining and Categorizing
	CO4.Evaluate the ecological and economi value of microbes, thallophytes and bryophytes.	General account onevolution of sporophytes in Bryophyta.Economic importance of bryophytes	Q5- Remembering, understanding- Analysis Examining and Categorizing

D.K. Govt. College for Women (A), Nellore
Department of Botany
Mapping of course outcomes with learning outcomes, 2021-22
Botany – Paper –II : Basics of Vascular plants and Phytogeography

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper –II : Basics of Vascular plants and Phytogeography	CO1. Understand recent discoveries, origin and evolution of group of first land vascular plants Pteridophytes.	Pteridophytes- Heterospory and seed habit. Evolution of stele in Pteridophytes.	Q1- Remembering, understanding- Exemplifying, Categorizing, Drawing
	CO2. Analyze and know the connecting links of cryptogams and phenorogams (gymnosperms)	Gymnosperms: classification, Economic importance.	Q2- Remembering, understanding- Identifying and estimating
	CO3. Analyze the morphology of the most common Angiosperm plants of their localities.	Plant nomenclature: Binomial system, ICN-rules for nomenclature. Herbarium and its techniques,	Q3- Remembering, understanding- Exemplifying, Identifying Categorizing
	CO4. Understand the Outlines of Angiosperm Phylogeny Group (APG IV).	Systematic description and economic importance of the families	Q4-Remembering, understanding- Exemplifying, Identifying Categorizing and Drawing
	CO5. Know the list various types of locate indifferent phytogeographical regions of the world and India	Phytogeographic regions of India. Vegetation types in Andhra Pradesh.	Q5- Remembering, understanding- Exemplifying and identification

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.
II B. Sc - SEMESTER–III: BOTANY THEORY PAPER, 2021-22
Paper-III : Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
PAPER III. Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity .	CO1. Understand on the organization of tissues and tissue systems in plants.	Meristems: Types of meristems based on position, Tunica-carpus theory and Histogen theory (only definition) and Tissue systems.	Q1- Remembering, understanding- Exemplifying, Identifying Categorizing
	CO2.Know the various aspects of embryology Understand the act of pollination and fertilization in plants	Structure of anther, ovule, pistil interaction and fertilization.	Q2- Remembering, understanding- Categorizing, grouping and determining
	CO3. Understand the Basic concepts of Ecology, biotic and abiotic interactions	Ecology branches and significance of ecology. Abiotic Factors & Biotic Factors.	Q3. Remembering, understanding, Applying- Drawing, Experimenting, Estimating
	CO4. Understand The characters of Population Ecology and Plant community Ecology.	1.Population-characteristics. 2.Plantcommunities-characters.	Q4-Analysis, evaluation.Application Knowledge- Solving, Hypothesizing
	CO5. Analyze and know the concept of Biodiversity &its importance.Understand the loss of biodiversity and conservation of biodiversity.	1. Definition, levels of biodiversity 2.Biodiversity hotspots 3.Loss of biodiversity 4.Seed banks	Q5- Knowledge, understanding. Analysis- Identifying and evaluation

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE

II B.Sc. BOTANY, SEMESTER- IV, 2021-22

PAPER –IV: Plant Physiology and Metabolism

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
PAPER –IV: Plant Physiology and Metabolism	CO1. –Analyze the necessity of Plant – Water relations.	1. Plant – Water relations.	Q1- understanding-Exemplifying, estimating and solving
	CO2. Acquire and know about Mineral nutrition, Nitrogen metabolism and Enzymes.	2.Mineral nutrition & Enzymes	Q2. Understanding-Exemplifying, estimating and solving
	CO3. Understand The PHOTOSYNTHESIS process and different path ways like C3 cycle, C4 cycle and CAM.	3. PHOTOSYNTHESIS	Q3 understanding-Exemplifying, estimating and solving
	CO4.Analyze and acquire knowledge about Respiration mechanism.	4. RESPIRATION & PLANT METABOLISM	Q4- Remembering, understanding-Exemplifying, estimating and solving
	CO5. Analyze and know the importance of Physiology of Phytochrome.	5. GROWTH AND DEVELOPMENT	Q5- Knowledge, understanding. Analysis - observation and evaluation.

D.K. Govt. College for Women (A), Nellore
Department of Botany
Mapping of course outcomes with learning outcomes, 2021-22
Botany –Paper-V: Cell Biology, Genetics and Plant Breeding

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper-V: Cell Biology, Genetics and Plant Breeding	CO1. Analyze the formation, structure and functions of Chromosomes and DNA.	Cell, the unit of life- Cell theory, Chromosomes, organization of DNA.	Q1-Remembering, understanding- Exemplifying, Drawing
	CO2. Understand similarities between DNA and RNA as the genetic materials in plants and animals.	DNA as the genetic material and Types of RNA.	Q2- Remembering, understanding- Exemplifying, Drawing
	CO3. Analyze and Understand the basic principles of genetic inheritance and gene interaction	Mendel's laws of Inheritance, Linkage and Crossing Over.	Q3- Understanding- Analysis and Solving
	CO4. Understand crop improvement practices.	Plant breeding. Crop improvement.	Q4- Remembering, understanding- Exemplifying, Drawing, Experimenting.
	CO5. Develop concept of plant tissue culture techniques.	Tissue culture technique and its applications.	Q5- Remembering, understanding, Applying- Experimenting, Estimating

D.K. Govt. College for Women (A), Nellore
Department of BOTANY. 2021-22
Mapping of course outcomes with learning outcomes
Semester –V, Paper-VI. Plant Ecology and Phytogeography.

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper-VI Plant Ecology and Phytogeography.	CO1. Understand the Basic concepts of Ecology, biotic and abiotic interactions	1. Ecology branches and significance of ecology. 2Abiotic Factors & Biotic Factors.	Q1. Remembering, understanding, Applying- Drawing, Experimenting, Estimating
	CO2. Acquire and know The types of Ecosystems,Productivity of Ecosystem and Biogeochemical cycles. the Population ecology	1. Concept and components of Ecosystem. 2.Productivity of ecosystem 3.Biogeochemical cycles	Q2- Remembering, understanding, Applying- Drawing, Experimenting, Estimating, Observing.
	CO3. Understand The characters of Population Ecology and Plant community Ecology.	1.Population-characteristics. 2.Plantcommunities-characters.	Q3-Analysis, evaluation. Application Knowledge- Solving, h Hypothesizing
	CO4.Acquire and know Principles of Phytogeography &Distribution of organisms and Endemism.	1.Phytogeography-Principles. 2.Endemism.	Q4-Knowledge/ recall and understanding
	CO5. Analyze and know the concept of Biodiversity &its importance.Understand the loss of biodiversity and conservation of biodiversity.	1. Definition, levels of biodiversity 2.Biodiversity hotspots 3.Loss of biodiversity 4.Seed banks.	Q5- Knowledge, understanding. Analysis- Identifying and evaluation.

D.K. Govt. College for Women (A), Nellore
Department of Botany
Mapping of course outcomes with learning outcomes, 2021-22
Botany – Elective, Paper VII-(B): Nursery, Gardening and Floriculture.

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Elective, Paper VII-(B): Nursery, Gardening and Floriculture.	CO1. Identify and use basic tools, equipment &materials, layout and design the garden component.	Nursery Management, infrastructure and Garden Operations.	Q1-Experimenting, Estimating, Understanding-Determining, Identifying, Planning and Evaluation
	CO2. Understand the seasonal Gardening and Ground maintenance of different planting and Culture of Floral Display.	Different types of gardening, Landscaping	Q2- Experimenting, Estimating, Understanding-Determining, Identifying, Planning and Evaluation .
	CO3. Knowledge of growing technologies of nursery stock. Plan the propagation of various types of plants using a range of propagation techniques,	Propagation of ornamental plants, Transplanting of seedlings.	Q3- Experimenting, Estimating, Understanding-Determining, Identifying, Planning and Evaluation
	CO4. Understand economic importance about the production of cut flowers, flowering pot plants, green foliage plants.	Ornamental Plants, Cultivation of plants in pots.	Q4- Experimenting, Estimating, Understanding-Determining, Identifying, Planning and Evaluation
	CO5. Know importance of sign and symptoms for detection of pathogens and	Cultivation of Important cut flowers, Management of pests, diseases.	Q5- Experimenting, Estimating, Understanding-Determining, Identifying and Evaluation

	disease, integrated methods of disease management.		

D.K. Govt. College for Women (A), Nellore
Department of BOTANY. 2021-22
Mapping of course outcomes with learning outcomes
Semester –VI, Paper-VIII Cluster-A1. Plant diversity and Human welfare.

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper-VIII Cluster-A1. Plant diversity and Human welfare.	**CO1**. Know about Agro biodiversity , Cultivated plant taxa and Wild taxa. 2. Acquire and understand Loss of diversity and Projected scenario for biodiversity loss. 3. Analyze Methodologies for valuation of Biodiversity.	1. Plant diversity and Loss of biodiversity.	Q1- Remembering, understanding- Estimating, Observing.
	CO2. Know about Organizations, Biodiversity legislation, conservation, Information management and communication of Biodiversity.	2. Management of Biodiversity.	Q2- Remembering, understanding, Applying- Estimating, Observing.
	CO3. Understand The Contemporary practices like EIA, GIS, Ecological foot print, Solid &liquid waste management etc.	3. Contemporary practices in resource management.	Q3- Analysis and evaluation. Application- understanding and Knowledge
	CO4.Analyze and acquire Conservation methods and Sustainable development.	4. Conservation of Biodiversity.	Q4-Knowledge/ recall - observation and understanding Identification.

	CO5. Analyze and know the importance of forestry, fruit crops, Avenue trees, Ornamental plants, Alcoholic beverages etc.	5. Role of plants in relation to Human Welfare.	Q5- Knowledge, understanding. Analysis - observation and evaluation.

D.K. Govt. College for Women (A), Nellore
Department of Botany
Mapping of course outcomes with learning outcomes, 2021-22
Botany – CLUSTER ELECTIVE -A
Paper VIII-A-2: ETHNOBOTANY AND MEDICINAL BOTANY

Name of the course	Course outcomes	essons/units/topics	Assessment as per learning outcomes
Paper VIII-A-2: ETHNOBOTANY AND MEDICINAL BOTANY	CO1.Understand the relationship between people and plants.	Ethnobotany as an Interdisciplinary science Tribals of India Plants used by the tribal populations.	Q1- Remembering, understanding- Observing.
	CO2. Learn the macroscopic and microscopic characters, chemical constituents, adulterants, therapeutical and pharmaceutical uses of medicinal plants.	Role of ethnobotany in modern medicine. Significance of the plants in ethno botanical practices.	Q2- Remembering, understanding- Observing
	CO3. Understand the protection of traditional knowledge under intellectual property law	Biopiracy, Intellectual Property Rights and Traditional Knowledge	Q3- Remembering, understanding- Observing
	CO4. Understand classical Ayurveda and its applications for the promotion of health.	**Ayurveda**: panchamahabhutas, saptadhatu and tridosha concepts.	Q4- Remembering, understanding- Observing.

	CO5. Develop propagation methods for select red listed species and conceive species recovery initiatives.	Endemic and endangered medicinal plants, Red list criteria	Q5- Remembering, understanding- Observing

D.K. Govt. College for Women (A), Nellore

Department of BOTANY. 2021-22

Mapping of course outcomes with learning outcomes

Semester –VI, Paper-VIII Cluster-A3.Pharmacognosy and Phytochemistry.

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper-VIII Cluster-A3. Pharmacognosy and Phytochemistry.	**CO1. Acquire and Know about importance and classification of Drugs.** Analyze **Drug evaluation methods.**	1. Pharmacognosy.	Q1- Understanding and Evaluation- Knowledge.
	CO2. Develop skills about Organoleptic and Microscopic studies of plant parts.	2. **Organoleptic and Microscopic studies**.	Q2- Understanding and Evaluation. Knowledge -writing skills.
	CO3. Understand And develop skills to identification of Primary and secondary metabolites.	3. Phytochemical constituents.	Q3- Identification, Observation. Analysis and evaluation. understanding and Knowledge.
	CO4. Acquire and know the importance of drugs from animal source.	4. D**rugs from animal sources.**	Q4-Knowledge/ recall - and understanding Identification.

	CO5. Analyze and know the importance of drugs from plant sources.	5. **Drugs from plant sources.**	Q5- Knowledge, understanding. Evaluation.

Department of Physics
Mapping of course outcomes with learning outcomes
2021-2022

Paper Title: Mechanics, Waves and Oscillations

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Mechanics, Waves and Oscillations	CO-1 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.	**UNIT-I:** **Mechanics of Particles** Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford Scattering-Derivation.	Understand
	CO-2 Apply the rotational kinematic relations, the principle and working of gyroscope and its applications and the processional motion of a freely rotating symmetric top.	**UNIT-I** **Mechanics of Rigid bodies** Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope. Precession of the equinoxes.	Analyze
	CO-3 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.	**Unit-II:** **Motion in a Central force field** Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS)	Evaluate
	CO-4 Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.	**UNIT-III:** **Relativistic Mechanics** Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation	Understand
	CO-5 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.	**UNIT-V** **Coupled Oscillations** Coupled oscillators-Introduction, Two coupled oscillators, Normal coordinates, and Normal modes- N-coupled oscillators and wave equation	Evaluate
	CO-6 Figure out 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-V:** **1. Vibrating Strings** Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtones and Harmonics, Melde's strings. **2. 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	**Understand**

Paper Title: Wave Optics

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Wave optics	**CO-1** 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.	**UNIT-I** **Interference of light:** Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude 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.	Understand
	CO-2 Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.	**UNIT-II** **Diffraction of light:** 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, Zone plate, comparison of zone plate with convex lens.	Analyze
	CO-3 Describe the construction and workinng of zone plate and make the comparison of zone plate with convex lens.	**UNIT-II Diffraction of light:** 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, Zone plate, comparison of zone plate with convex lens.	Understand
	CO-4 Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.	**UNIT-III** **Polarisation of light:** 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, Optical activity, Laurent's half shade polarimeter: determination of specific rotation, Basic principle of LCDs	Understand

	CO-5 Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.	**UNIT-V** **Lasers and Holography and Fibre Optics:** **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.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.	Apply
	CO-6 Explain about the different aberrations in lenses and discuss the methods of minimizingthem.	**UNIT-IV** **Aberrations** **(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. 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.	Understand
	CO-7 Understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications	**UNIT-V** **Lasers and Holography and Fibre Optics:** 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. 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.	**Understand**

Paper Title: Heat and Thermodynamics

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Heat and Thermodynamics	**CO-1** Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases	**UNIT-I Kinetic Theory of gases:** Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities 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.	Understand
	CO-2 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.	**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	Understand
	CO-3 Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency	**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	Understand
	CO-4 Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.	**UNIT-III:Thermodynamic Potentials and Maxwell's equations:** **(12hrs)** Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clapeyron's equation (ii) Value of CP-CV (iii) Value of CP/CV (iv) Joule-Kelvin coefficient for ideal and V Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clapeyron's equation (ii) Value of CP- CV (iii) Value of CP/CV (iv) Joule-Kelvin c	Apply

	CO-5 Differentiate between principles and methods to produce low temperature and liquefy air and understand the practical applications of substances at low temperatures.	**UNIT-IV** **Low temperature Physics:** 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)	Analyze
	CO-6 Examine the nature of black body radiations and the basic theories.	**UNIT-V Quantum theory of radiation:** Blackbody and its spectral energy distribution of black body radiation, Kirchhoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh- Jean's law from Planck's law, Solar constant and its determination using Angstrom pyrheliometer, Estimation of surface temperature of Sun.	Analyze

Paper Title: Electricity, Magnetism and Electronics

Name of thecourse	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Electricity, magnetism and electronics	**CO-1** ❖ 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.	**UNIT-I** **Electrostatics:** 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	Understand
	CO-2 ❖ Distinguish between the magnetic effect of electric current and electromagnetic inductionand apply the related laws in appropriate circumstances.	**UNIT-II** **1. 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. **2.** **Electromagnetic Induction:** **(6 hrs)** Faraday'slaws 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	Analyze
	CO-3 ❖ Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.	**UNIT-II** **1. 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.	Understand

		2. **Electromagnetic Induction:** **(6 hrs)** Faraday'slaws 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	
	CO-4 ❖ Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves. .	**UNIT-III** **2.Electromagnetic waves- Maxwell's equations:** Idea of displacement current, Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement and proof)	Create
	CO-5 ❖ Phenomenon of resonance in LCR AC-circuits, sharpness of resonance Q- factor, Power factor and the comparative study of series and parallel resonant circuits.	**UNIT-III** **1.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.	Apply
	CO-6 ❖ Describe the operation of p-n junction diodes, Zener diodes, light emitting diodes and transistors	**UNIT-IV Basic Electronic devices:** PN junction diode, Zener diode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristics of a transistor in CE mode, Relation between alpha, beta and gamma; Hybrid parameters, Determination of hybrid parameters from transistor characteristics; Transistor as an amplifier.	Understand
	CO-7 ❖ Understand the operation of basic logic gates and universal gates and their truth tables.	**UNIT-V** **Digital Electronics:** 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.	**Understand**

Paper Title: Modern Physics

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Modern Physics	**CO-1** ❖ Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.	**UNIT-I** **Atomic and Molecular Physics** 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.	Understand
	CO-2 Develop critical understanding of concept of Matter waves and Uncertainty principle.	**UNIT-II** **Matter waves & Uncertainty Principle:** 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.	Evaluate
	CO-3 Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.	**UNIT-III:** **Quantum (Wave) Mechanics:** Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height (Infinite Potential Well) and (ii) one dimensional harmonic oscillator.	Understand

	CO-4 Examine the basic properties of nuclei, characteristics of nuclear forces, salient features of nuclear models and different nuclear radiation detectors.	**UNIT-IV:NuclearPhysics:** *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.	Analyze

	CO-5 Classify Elementary particles based on their mass, charge, spin, half-life and interaction.	**UNIT-IV:** **Nuclear Physics:** *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.	Understand
	CO-6 Get familiarized with the nano materials, their unique properties, and applications.	**UNIT-V** **1.Nano materials:** Nanomaterials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Quantum Wells, Nano wires, Fullerene, CNT, 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*)	Understand
	CO-7 Increase the awareness and appreciation of superconductors and their practical applications.	**UNIT-V** **1.Super conductivity:** 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.	**Understand**

Paper Title: Renewable Energy

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Renewable Energy	CO-1 Understanding the concept of Different Renewable energy sources.	**UNIT-I** **1. Introduction to Energy:** Definition and units of energy, power, Forms of energy, Conservation of energy, Conventional energy sources, Role of energy in economic development and social transformation. **2. Environmental Effects:** Environmental degradation due to energy production and utilization, air and water pollution, depletion of ozone layer, global warming, biological damage due to environmental degradation.	Understand
	CO-2 Basic knowledge on construction of different types of solar cells	**UNIT-III** **1..Solar energy:** Solar energy, Spectral distribution of radiation, Flat plate collector, solar water heating system,. Solar cell, Types of solar cells, Solar module and array, Components of PV system, Applications of solar PV systems.	Understand
	CO-3 Construction of Wind turbines	**UNIT-III** **2.Wind Energy:** Introduction, Principle of wind energy conversion, Components of wind turbines, Operation and characteristics of a wind turbine,	Create
	CO-4 Understanding the Origin of Tides and Tidal energy technologies.	**UNIT-IV** **1. Ocean Energy:** Introduction, Principle of ocean thermal energy conversion, Tidal power generation, Tidal energy technologies, Energy from waves.	Understand
	CO-5 Understanding Ocean thermal energy Conversion.	**UNIT-IV (12 hrs)** **1.Ocean Energy:** Introduction, Principle of ocean thermal energy conversion, Tidal power generation, Tidal energy technologies, Energy from waves.	Understand

Paper Title: Solar, Thermal and Photovoltaic Aspects

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Solar, Thermal and Photovoltaic Aspects	CO-1 Understanding the concept of sun and different layers existing in Structure of Sun, Measurement of Solar constant using Pyrheliometer.	**UNIT-I** **1. Basics of Solar Radiation:** Structure of Sun, Spectral distribution of extra terrestrial radiation, Solar constant, definition of declination, hour angle, solar and surface azimuth angles; Solar intensity measurement, pyrheliometer.	Understand
	CO-2 Knowledge on Collectors and different types of Flat plate collectors.	**UNIT-II** **1. Flat Plate Collectors (FPC) :** Description of flat plate collector, Liquid heating type FPC, , Definitions of fin efficiency and collector efficiency, Evacuated tubular collectors. **2. Concentrating Collectors:** Classification, design and performance parameters; Definitions of aperture, rim-angle, concentration ratio and acceptance angle; Tracking systems;	Understand
	CO-3 Understanding the preparation methods of Single crystal silicon	**UNIT-III** **2.Solar cell fabrication:** Production of single crystal Silicon: Czokralski (CZ) and Float Zone (FZ) methods, Silicon wafer fabrication, Wafer to cell formation – Thin film solar cells,advantages.	Understand
	CO-4 Knowing the difference between modules Connected in Series and Parallel	**UNIT-IV** **2. Solar PV systems:** Solar cell module assembly – Steps involved in the fabrication of solar module, Module performance, I-V characteristics, Modules in series and parallel,	Understand

	CO-5 Basic Knowledge on different types of Solar water heating systems, and difference between Natural drying, solar drying	**UNIT-V** **1.Solar thermal applications:** Solar hot water system (SHWS), Types of SHWS, Standard method of testing the efficiency of SHWS; Passive space heating and cooling concepts, Solar desalinator and drier, Solar thermal power generation.	Analyze

Paper Title: Wind, Hydro and Ocean thermal energies

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Wind, Hydro and Ocean energies	CO-1 Understanding the principle of Generation of Wind.	**UNIT-I** **1. Introduction:** Wind generation, meteorology of wind, world distribution of wind, wind speed variation with height, wind speed statistics, Wind energy conversion principles; 2. Wind Measurements:Eolian features, biological indicators, rotational anemometers, other anemometers, wind measurements with balloons.	Understand
	CO-2 Working principle of Anemometer	**UNIT-I** **1. Introduction:** Wind generation, meteorology of wind, world distribution of wind, wind speed variation with height, wind speed statistics, Wind energy conversion principles; 2. Wind Measurements:Eolian features, biological indicators, rotational anemometers, other anemometers, wind measurements with balloons.	Analyze
	CO-3 Aerodynamic theory and theories of wind turbines	**UNIT-II** 1.Wind Energy Conversion System:Aerodynamic design principles; Aerodynamic theories; Axial momentum, blade element and combine theory; Rotor characteristics; Maximum power coefficient;. 2. Design of Wind Turbine: Wind turbine design considerations	Understand
	Co-4 Applications of Wind energy	**UNIT-III** 1.Wind Energy Application: Wind pumps: Performance analysis, design concept and testing; Principle of wind energy generation; Standalone,	Apply

		grid connected and hybrid applications of wind energy conversion systems,	

Paper Title: Energy Storage Devices

Name of the course	Course Outcomes	Lesson/units/Topics	Assessment as per Blooms learning outcomes
Energy Storage Devices	CO-1 Understand the primary batteries and Secondary batteries.	**UNIT-II** **Electro chemical Energy Storage Systems:** Batteries: Primary, Secondary, Lithium, Solid-state and molten solvent batteries; Lead acid batteries; Nickel Cadmium Batteries	Understand
	CO-2 Knowledge on different types of Secondary batteries.	**UNIT-II** **Electro chemical Energy Storage Systems:** Batteries: Primary, Secondary, Lithium, Solid-state and molten solvent batteries; Lead acid batteries; Nickel Cadmium Batteries	Remember
	CO-3 Understanding the difference between Capacitors and Inductors.	. **UNIT-III** **Magnetic and Electric Energy Storage Systems:** Superconducting Magnet Energy Storage(SMES) systems; Capacitor and battery:Comparison and application; Super capacitor: Electrochemical Double Layer Capacitor(EDLC), principle of working, structure, performance and application.	Understand
	CO-4 Understanding the concept of Fuel cells	**UNIT-IV** **Fuel Cell:** Fuel cell definition, difference between batteries and fuel cells, fuel cell components, principle and working of fuel cell, performance characteristics,efficiency, fuel cell stack, fuel cell power plant	Understand

	CO-5 Knowledge on different types of Fuel cells	**UNIT-V** **1. Types of Fuel Cells:** Alkaline fuel cell, polymer electrolyte fuel cell, phosphoric acid fuel cell,molten carbonate fuel cell; solid oxide fuel cell,proton exchange membrane fuel cell, problems with fuel cells, applications of fuel cells.	Understand

D. K. GOVERNMENT COLLEGE FOR WOMEN

Nellore, Andhra Pradesh- 524003

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Department of Chemistry
Mapping of course outcomes with learning outcomes
Chemistry 2021-22

Name of the course	Course outcomes	Lessons/ units/ topics	Assessment as per Blooms learning outcomes
Semester – 1 Inorganic & Physical chemistry	Co 1 Have Knowledge about preparation methods of definite inorganic compounds in industrial wise Co 2 -	UNIT – I *INORGANIC CHEMISTRY* *UNIT –I* Chemistry of p-block elements Group 13: Preparation & structure of Diborane, Borazine Group 14: Preparation, classification and uses of silicones Group 15: Preparation & structures of Phospho nitrilic halides {(PNCl2) where n=3, 4 Group 16: Classification of oxides based on (i) chemical behaviour and (ii) oxygen content Group 17: Pseudohalogens, Structures of Interhalogen compounds UNIT-II *1. Chemistry of d-block elements:* Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic	Understanding, Evaluation and Analysis Understand, knowledge And application

	Gain knowledge about several chemical principals involved in the periodic table . Co 3 Understand the basic principle Solid state Co 4 Gain knowledge about ideal behaviour of gases, wander wall	properties, catalytic properties and ability to form 67 complexes. Stability of various oxidation states. *2. Chemistry of f-block elements:* 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: 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* UNIT-III Solid state 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 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*	Understand the basics of X ray diffraction crystal statures Awareness of gas laws, Joul thomson effect and basic knowledge of liquid crystals

	equation etc., and Gain knowledge about applications of liquid crystals as LCD devices Co.5 Gaining knowledge about distribution laws and collegative properties	Liquid crystals,mesomorphic state. Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices. 68 *UNIT-V* Solutions & dilute solutions 1. Solutions Azeotropes-HCl-H2O 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. Dilute Solutions 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 boiling point and depression in freezing point. Abnormal collegative properties	Knowledge About azeotropes, CST, Nerst law of distribution etc.,
Semester – 2 Paper – 2 Organic & General Chemistry	CO1 – Gain Knowledge about the basics of organic Chemistry	*ORGANIC CHEMISTRY* UNIT-I Recapitulation of Basics of Organic Chemistry Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes) General methods of preparation of alkanes- Wurtz and Wurtz Fittig reaction, Corey House synthesis, Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane and butane).General molecular formulae of	To equip the students for job opportunities in organic chemistry in various industrial sector

		cycloalkanes and relative stability, Baeyer strain theory,Cyclohexane conformations with energy diagram. *UNIT-II*	
	CO2 Learn and identify the types of organic reactions	Carbon-Carbon pi Bonds (AlkenesandAlkynes)General methods of preparation, physical and chemical properties. Mechanism of E1,E2,E1cb addition addition of H2,X2.oxymercuration-Demercuration, hydroboration- 77 reactions, Saytzeff and Electrophilic Additions, mechanism with suitable examples,, *syn* and *anti-* oxidation, ozonolysis, hydroxylation, Diels Alder reaction,1,2- and 1,4-addition reactions in conjugated dienes.	Knowledge, Conceptual Understanding and analysis
	CO3 Able to understand the concept of aromaticity, Huckles rule	*UNIT-III* Benzene and its reactivity Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropylium cation) 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 NO2 and Phenolic). Orientation of (i) Amino (ii) nitroHalogens (Explanation by taking minimum of one example from each type)	Understand, knowledge And application
	CO-4 Basic knowledge regarding colloids and surface chemistry and applications	GENERAL CHEMISTRY UNIT-IV *1. Surface chemistry and chemical bonding* *Surface chemistry* 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.	Gain knowledge regarding Industrial applications of surface chemistry and colloids Knowledge, Conceptual

	Co-5 Have knowledge about stereo chemistry of carbon compounds	*2. Chemical Bonding 6h* Valence bond theory, hybridization, VB theory as applied to ClF3, Ni(CO)4, Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N2, O2, CO and NO). *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 polarized light, optical rotation and specific rotation. 78 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)	Understanding and analysis Structure writing and analysis Depth knowledge on Optical activity
Semester – 3 Paper – 3 Organic chemistry & Spectrosc	CO1 - understand preparation and properties and the reactions of halo alkanes, halo arenes and hydroxyl group	UNIT – I Chemistry of Halogenated Hydrocarbons: Alkylhalides: Methods of preparation and properties, nucleophilic substitution reactions– SN1,SN2andSNi mechanisms with stereo chemical aspects and effect of solvent etc. ;nucleophilic substitutions. elimination, Williamson's synthesis. Alcohols &Phenols Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols,	Gain knowledge about reaction mechanism of alky halides and alcohols

opy	containing compounds	Bouvaelt Blanc Reduction; Oxidation of diols by periodic acid and lead tetra acetate,Pinacol- Pinacolone rearrangement; Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements with mechanism;	
	CO2 – understand the nucleophilic addition reactions of aldehydes and ketones and synthetic applications of active methylene group compounds	UNIT-II Carbonyl Compounds 1 Structure,reactivity,preparation and properties; Nucleophilic additions,Nucleophilic addition-elimination reactions with ammonia derivative Mechanisms of Aldol and Benzoin condensation, Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction,Beckmann haloform reaction and BaeyerVillige oxidation,α- Substitution reactions, oxidations and reductions(Clemmensen, w – kishner with LiAlH4 &NaBH4). Addition reactions of α,β-unsaturated carbonyl compounds: Michael addition. Active methylene compounds: Keto-Enol tautomerism.Preparation and synthetic applications of diethyl Malonate and ethyl aceto acetate	An elaborative explanation was given on the properties of aldehydes and ketones.
	CO-3- Acquire the knowledge about carboxylic acids like esterifications like alpha halogenations, acidic, basic hydrolysis esters	UNIT-III CarboxylicAcidsand their Derivatives General methods of preparation, physical properties and reactions of mono carboxylic acids, effect of Substituents on acidic strength. Comparative study of nucleophilic substitution at acyl group-Mechanism of aci and alkaline hydrolysis of esters, Claisen condensation, Reform at sky reactions and Curtius rearrangement. 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, halogenation by Hell- Volhard- Zelinsky reaction SPECTROSCOPY	Knowledge and understanding mechanism of esterification and industrial applications

	CO-4 Understand the molecular spectroscopy like electronic spectroscopy and NMR spectroscopy of compounds and its applications in structural problems CO5- Apply the knowledge of IR and UV visible spectroscopy in identification of organic compound	UNIT-IV Molecular Spectroscopy: Interaction of electromagnetic radiation with molecules and various types of spectra; 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 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 λmax 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 intra molecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).	Structural elucidation of organic compounds Depth knowledge on Optical activity Identification conjugation and functional group identification
Semester – 4 Paper – 4	Co-1 Understand the bond between metal and carbon	UNIT - I Organometallic Compounds Definition and classification of organometallic Compounds on the basis of bond type. General methods of preparation of mono and binuclear carbonyls	Gain knowledge about synthetic applications of

Inorganic, Organic & Physical chemistry	in organometallic compounds Co -2 Learn importance of carbohydrates, structures of glucose and fructose they learn some inter conversions of carbohydrates Co- 3 Understand alpha amino acids and tetra cyclic compounds prepations, properties and their importance	of 3dseries.P-acceptor behaviour of carbon monoxide. UNIT – II Carbohydrates Occurrence, classification and their biological importance, Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Inter conversions of aldoses andketoses; Killiani-Fischer synthesis and Ruff degradation. UNIT- III Amino acids and proteins 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 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.	organo metallic compounds Understand the classification, structures and their inter conversions Awareness of essential and non essential amino acids and their significance in human body Knowledge, understanding and evaluation

	Co-1 Understand the bond between metal and carbon in organometallic compounds Co -2 Learn importance of carbohydrates, structures of glucose and fructose they learn some inter conversions of carbohydrates Co- 3 Understand alpha amino acids and tetra cyclic compounds prepations, properties and their importance	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 Nitrogen Containing Functional Groups Preparation, properties and important treactions of nitrocompounds, amines and diazonium salts. 1. Nitro hydrocarbons 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: Introduction, classification, chiralityin amines (pyramidal inversion), importance and general methods of preparation. Properties : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary aminesusing Hinsberg's method and nitrousacid. Discussion of thefollowing reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann- Bromamidereaction, Carbylaminereaction, Mannichreaction, Hoffmann'sexhaustive methylation, Hofmann- elimination reaction and Copeelimination. Diazonium Salts: Preparation and synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols. Coupling reactions of diazonium salts (preparation of azo dyes). UNIT- IV Nitrogen Containing Functional Groups	Conceptual learning Importance of electrochemical series Gain knowledge about coupling reactions and significance of diazotization etc.

	Co-4 Learn about preparations properties nitro alkanes, amines and reaction mechanisms Co -5 Understand about mechanisms of photo chemical reactions, concepts of thermodynamic laws, kirchoffs equation and carnots cycle	Preparation, properties and important treactions of nitrocompounds, amines and diazonium salts. 1. Nitro hydrocarbons 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: Introduction, classification, chiralityin amines (pyramidal inversion), importance and general methods of preparation. Properties : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary aminesusing Hinsberg's method and nitrousacid. Discussion of thefollowing reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann- Bromamidereaction, Carbylaminereaction, Mannichreaction, Hoffmann'sexhaustive methylation, Hofmann- elimination reaction and Copeelimination. Diazonium Salts: Preparation and synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols. Coupling reactions of diazonium salts (preparation of azo dyes). UNIT- V Photochemistry 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 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	Gain knowledge about photo chemical laws, quantum yield, jablonski diagram and thermodymics laws and their importance in daily life

		isothermal and adiabatic conditions for reversible processes, State function. Second law of thermodynamics Different Statements of the law, Carnot cycle, 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 Theorm , Spontaneous and non- spontaneous processes, Helmholtz and Gibbs energies-Criteria for spontaneity.	
Semester – 4 Paper – V Inorganic , Organic and Physical Chemistry	CO-I Learn the nomen cloture of complexes understand the theories of coordination compounds and factors affected CO-II To understand the reactivity of metal complexes use of chelating agents in medicins and drugs	UNIT –I Coordination Chemistry IUPAC nomenclature of coordination compounds, structural and stereoisomersm of 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, square planar coordination UNIT –II Inorganic Reaction Mechanism: Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transitionstate, intermediate and activated complex. Labile and inert complexes, lig and substitution reactions - SN1 and SN2,Substitutionreactions in square planar complexes, Trans-effect, the ories of trans effect and its applications Stability of metal complexes: 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. Bioinorganic Chemistry: Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of	Understanding and knowledge various theories and their applications Basic knowledge about reaction mechanism of metal complexes Understanding and knowledge about bio Inorganic Reactions

		metals, Sodium/K- pump, carbonicanhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metalions(Hg,Pb,Cd 107 and As), reasons for toxicity, Use of chelating agents in medicine, Cis platinasan anti-cancer drug. Iron and its application in bio-systems, Haemoglobin, Myoglobin. Storage and transfer of iron.	
	CO-III Learn the phase rule and the terms understanding the water system, Pb-Ag and salt water system. CO-IV.-Learn the nature of electrolytes, transport number, kholarch law and it applications application of single eletrode potential and electrolytic cell CO-V Understand the types of organic reactions and derivation of rate	PHYSICAL CHEMISTRY UNIT-III 1 .Phase rule Concept 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, ii) NaCl-Water system. UNIT-IV Electrochemistry 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. UNIT-V Chemical Kinetics: 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	Study of phase diagrams of various systems Understanding, evaluation of transport number, conductometric titrations, single electrode potential etc., Gain knowledge about first, second order kinetics and methods for determination of organic reactions and different theories of rate of reactions

	constant for the order of reactions, knowledge about rate reaction and factors affecting rate of reactions and different theories of rate of reactions	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.	
Semester – 5 Paper –VI Inorganic , Physical & Organic Chemistry	CO-I Learn the nomen cloture of complexes understand the theories of coordination compounds and factors affected Co-2 Learn the different types of isomerism in coordination compounds	INORGANIC CHEMISTRY UNIT – I Coordination Chemistry: IUPAC nomenclature - bonding theories - Review of Werner's theory and Sidgwick's concept of coordination - Valence bond theory - geometries of coordination numbers 4- tetrahedral and square planar and 6-octahedral and its limitations, crystal filed theory - splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes - low spin and high spin complexes - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. UNIT-II 1. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouymethod. 2. Stability of metal complexes: Factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.	Understanding and knowledge various theories and their applications Basic knowledge on isomerism and magnetic properties of complexes

	CO3. Study the preparations and properties of nitro hydrocarbons CO.4. Understand the synthesis and properties of amines and reaction mechanism CO.5. Acquire the knowledge first and second laws of thermodynamics and concepts of entropy and enthalpy and kirchoffs equation	ORGANIC CHEMISTRY UNIT- III Nitro hydrocarbons: 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 UNIT – IV Nitrogen compounds : Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization. PHYSICAL CHEMISTRY UNIT- V Thermodynamics The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule-Thomson effect-coefficient. Calculation of w, 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. Entropy changes in spontaneous and equilibrium processes.	Awareness about industrial applications of some named organic reactions like Nef reaction, Mannich reaction etc., Gain knowledge about coupling reactions and significance of diazotization etc. Basic knowledge about thermodynamic laws and efficiency of heat engines in automobile industry

Paper-VII	CO-I- To understand the reactivity of metal complexes apply the knowledge of essential elements in daily life CO-2- Understand the types of order of reactions and derivation of rate constant for the order of reaction. Knowledge about rate of reaction and factors affecting rate of reaction and	INORGANIC CHEMISTRY UNIT-I 1. Reactivity of metal complexes: Labile and inert complexes, ligand substitution reactions - SN1 and SN2, substitution reactions of square planar complexes - Trans effect and applications of trans effect. 2. Bioinorganic chemistry: 4h Essential elements, biological significance of Na, K, Mg, Ca, Fe, Cu, Zn. Metalloporphyrins – Structure and functions of hemoglobin, Myoglobin and Chlorophyll. PHYSICAL CHEMISTRY UNIT-II 1. Chemical kinetics Rate of reaction - Definition of order and molecularity. Definition and Derivation of rate constants for zero, first and second order reactions and examples. Derivation for half-life time change(t1/2) for zero,first and second order reactions. Methods to determine the order of reactions. Effect of temperature on rate of reaction, Arrhenius equation. 2. Photochemistry 5h Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of	Basic knowledge about reaction mechanism of metal complexes Gain knowledge about first, second order kinetics and methods for determination of organic reactions and different theories of rate of reactions and gain knowledge about photo chemical laws, quantum yield, jablonski diagram Gain knowledge about basic synthetic organic chemistry

	different theories of rate of reaction. Knowledge about photochemical laws and quantum yield CO-3- understand the preparation and properties of hetero cyclic compounds CO.4. Learn importance of carbohydrates, structures of glucose and fructose they learn some inter conversions of carbohydrates CO.5. Understand amino acids preparations and their importance in	photochemical equivalence. Quantum yield-Photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Photosensitized reactions. ORGANIC CHEMISTRY UNIT- III Heterocyclic Compounds Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole – Preparation from 1,4,-dicarbonyl compounds, Paul- Knorr synthesis. Preparation of furan,pyrrole and thiophene (two methods for each) Properties : Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan. Reactivity of furan, pyrrole and thiophene comparison UNIT-IV Carbohydrates Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula). Interconversion of Monosaccharides: Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose) UNIT- V Amino acids and proteins Introduction: Definition of Amino acids, classification of Amino acids into	Understand the classification, structures and their inter conversions Awareness of essential and non essential amino acids and their significance in human body

	the daily life	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) by following methods: a) from α - halocarboxylic acid b) strecker's synthesis c) Gabriel pthalimide synthesis. Zwitter ion structure ,isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups – Action of heat on alpha, beta and gamma amino acids	
Semester VI Paper 8A Elective Paper Analytical Methods in Chemistry	CO-I Get acquired knowledge of theories of acid base titrations, redox titrations, complexometric titrations etc., understand applications of calorometry CO-II- Learn types of errors, minimisation of errors, accuracy	UNIT-I Quantitative analysis: a) Principles of volumetric analysis :. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations - choice of indicators for these titrations. b.Colorimetry...applications of colorimetry : Estimation of Glucose,urea,Creatinine,lipids and proteins in blood. UNIT-II Treatment of analytical data: Types of errors, error analysis and minimization of errors, accuracy - methods of expressing accuracy precision - methods of expressing precision, significant figures and its importance standard deviation and confidence limit.	Awareness about different types of titrations like redox, precipitation etc., and colorometric determination of glucose, urea etc., Awareness of minimisation of errors in doing experiments

	and precession understand the significant figures and importance of standard deviation CO-III- get acquired knowledge on solvent extraction ,batch extraction, m understand continues and counter counter current extraction CO-IV-Knowledge about classification of chromatography Rf values and factors affecting Rf values unders atd the technique involved in types of paper chrommatography CO-V-Understand the principle involved in TLC and	UNIT-III Separation techniques in chemical analysis: solvent extraction: Introduction,principle,techniques,factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism. Application - Determination of Iron (III) UNIT – IV Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values. dimensional chromatography, applications. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial. dimensional chromatography, applications. UNIT -V Thin layer Chromatography (TLC): Advantages. Principles, factors effecting Rf values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications. Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications HPLC: Basic principles and applications.	Knowledge, evaluation and extraction of compounds by different methods through practical demonstration Getting knowledge about separation techniques by different chromatographic methods like Paper, TLC, Column, HPLC etc., Getting knowledge about separation techniques by different chromatographic methods like Paper, TLC, Column, HPLC etc.,

Paper-8 Cluster-1 Organic Spectroscopic Techniques	development of chromatogram aquired knowledge about column chromatography and HPLC CO.I- Get Knowledge about Priciple involved in nNMR Spectroscopy, Chemical shifts, shielding and desheilding affects, Spin-Spin coupling etc., CO.2. Understanding of spin decoupling, deuterium exchange and nuclear over hauser effects CO.3.Aquire knowledge about born oppenheimer	UNIT-I NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY Nuclear spin, Principles of NMR, Magnetic moment and Spin angular momentum. Larmour Frequency. Instrumentation. Shielding constants, Chemical shifts, Shielding and deshielding effects.Factors influencing Chemical shift. Spin-Spincoupling, coupling constants- Factors influencing coupling constants. UNIT – II Spin decoupling, Spin tickling, Deuterium exchange, Chemical shift reagents and nuclear over hauser effect. UNIT-III UV & VISIBLE SPECTROSCOPY Electronic spectra of diatomic molecules. The Born-oppenheimer approximation. Intensity of Vibrational-electronic spectra.Absorption and intensity shifts, Bathochromic shift(Red shift),Hypsochromic shift(Blue shift). The Franck-Condon principle. Types of transitions, Chromophores and	Gain knowledge about structural elucidation by matching with the standard chemical shifts Acquire knowledge about Spin decoupling, chemical shift reagents etc., Understanding of conjugation of organic compounds, bthochromic, hipsochromic shifts Understanding of

C2-Advanced Organic Reactions	approximation, bathocromic shifts and hypsochromic shifts. Learn importance of Frank condon principle, chromophores and auxocrome and wood word fisher rules CO.4. Understanding the chemical analysis of metals by using Beers lamberts law CO.5. Awareness ESR spectroscopy, Hyperfine splitting etc., acquire the knowledge about applications of ESR spectra in detection of free radicals CO.1 Knowledge about molecular arbitals, carbony	oxochromes, Woodward – Fieser rules, calculation of λmax for Conjugated dienes, trienes and polyenes, unsaturated carbonyl compounds. UNIT-IV Chemical analysis by Electronic Spectroscopy, Beer-Lamberts Law and its limitations Quantitative determination of metal ions (Mn+2, Fe+2 and Cr+3). UNIT-V Electron Spin Resonance Spectroscopy Basic Principles, Theory of ESR, Instrumentation. g-value and its significance, hyper fine splitting, coupling constants. Applications:- Detection of free radicals; ESR spectra of (a) Methyl radical(CH3·), (b) Benzene anion (C6H6-) (c) Isopropyl radical (d) [Cu(H2O)6]+2 (e) [Fe(CN)5NO]-3 UNIT – I ORGANIC PHOTOCHEMISTRY Organic photochemistry : Molecular orbitals, carbonyl chromophore–singlet and triplet states, Jablonski diagram, non-radiative transitions,vibrational relaxation, Internal conversion (IC) and inter–system crossing(ISC). Radiative transitions, fluorescence and phosphorescence. Chemiluminiscence-with examples, photosensitization and Energy transfer.	Quantitative determination of metal ions (Mn+2, Fe+2 and Cr+3). Detection of free radical compounds Understanding of jablonski diagram, radiative and non radiative wemmisions, singlet and triplet states etc., Gain knowledge about several photo organic reactions like norish type-i and II, dipi methane fries migration reactions

	chromophore and singlet triplet states understanding of radiative and non radiative transitions in jablonski diagram CO.2. Understanding the mechanisms involved in photochemical reactions like norish type-1,type-2,fries migration etc., CO.3-Understand the importance of protecting group and its characteristics. Acquire the knowledge about the principle involved in the protection of alcohols and diols etc.,	UNIT – II ORGANIC PHOTOCHEMISTRY Norrisch type-1cleavages, Norrisch type II cleavage and Norrisch Yang reaction Paternobuchi reaction,Photo Fries rearrangement and Di - π methane rearrangement,Barton reaction. UNIT – III PROTECTING GROUPS AND ORGANIC REACTIONS Protecting groups and its characteristics ,Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal,ketal and carbonate formation, (3) Protection of carboxylic acids – ester formation, benzyl and t-butyl esters,. UNIT – IV Synthetic reactions : Mannich reaction – The Shapiro reaction, Stork–enamine reaction, phase transfercatalysis(definition only), Wittig reaction, Robinson annulation UNIT –V : NEW SYNTHETIC REACTIONS Baylis–Hillman reaction, RCM olefin metathesis, Mukayama aldol reaction, Mitsunobu reaction, McMurrey reaction, Julia–Lythgoe olefination, and Peterson , stereoselective olefination.	Awareness about the definition of protecting group and protection of some functional groups like diols and alcohols and also their importance in synthetic organic chemistry Getting knowledge on reaction mechanism of some named reactions like mannich, Shapiro reaction etc., Getting knowledge on reaction mechanism of some named reactions like Baylis-Hilman,RCM olefin metathesis reaction etc., Understanding of

C3- Pharmaceutical and medicinal chemistry	CO.4- gain knowledge about the reaction mechanism involved in the advanced synthetic reactions like mannich reaction, shapiro reaction, robinson annulations. CO.5. Importance of applications advanced organic synthetic reactions like balis-Hilmann reaction, mukayama aldol condensation, mac murray reaction Peterson olifination reaction CO.1. Acquire knowledge about terminology like pharmacy, pharmacology, pharmaco	UNIT-I Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors - brief treatment) Metabolites and Anti metabolites. UNIT-II Drugs: Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each. UNIT-III Synthesis and therapeutic activity of the compounds:	definitions like Pharmacore, Pharmacokinetics etc., Acquire knowledge on nomenclature, chemical name, generic name etc., of some drugs and theit classification Gain knowledge on the synthesis of some drugs Chemotheraputic Drugs, Sulphadrugs,Anti malarial drugs etc., Basic knowledge on Pharmaco dynamic drugs like antiasthma Drugs antianginals

	dynamics pharmaco kinetics understanding of terms metabolites and antimetabolites CO.2. Importance nomenclature of chemical name, generic name , trade name, understanding of classification of drugs based on structure and therapeutic activity CO.3. Learn the importance of chemotherapic drugs, sulpha drugs, anti biotic etc., acquire knowledge on psychotherapeutic drugs like parcetamol,diazopalm CO.4. Learn about synthesis of pharmaco dynamic drugs like anti asthama, antianginals,	a. Chemotheraputic Drugs l.Sulphadrugs (Sulphamethoxazole) 2.Antibiotics - β- Lactam Antibiotics like pencillin,Macrolide Antibiotics,Azithromycin 3. Anti malarial Drugs(chloroquine) b. Psycho therapeutic Drugs:1.Anti pyretics(Paracetamol), 2.Tranquilizers(Diazepam) 3.Levodopa UNIT-IV Pharmacodynamic Drugs: 1. Antiasthma Drugs (Solbutamol) 2. Antianginals (Glycerol Trinitrate) 3. Diuretics(Frusemide) UNIT-V HIV-AIDS: Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, prevention of AIDS, Drugs available - examples with structures: PIS: Indivanir (crixivan), Nelfinavir(Viracept)	Extensive knowledge on HIV AIDS drugs like Indivanir, Nelfinavir

	diuretics CO.5. Getting knowledge on HIV drugs, human immunity prevention of HIV AIDS like indivanir, Crixivan, Nelfinavir etc.,		

D. K. GOVERNMENT COLLEGE FOR WOMEN

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Department of Microbiology

Mapping of course outcomes with learning outcomes, 2021-22

Microbiology– Paper- I : Introduction to microbiology and microbial diversity

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper- I : Introduction to microbiology and microbial diversity	CO1: understand the how to evolve microbiology	History and milestones of microbiology	Q1- Remembering, understanding
	CO2. Understand the contributions of scientists	Antonyvanleewen hock , Edward jenner, Louis Pasteur, Robert coach and Ivanowsky	Q2- Remembering, understanding
	CO3. Understand the applications of microbiology	Importance and applications of microbiology	Q3- Remembering, understanding, Analyzing, Evaluating.
	CO4. Understand the classification of microorganisms	Bergeys manual and Whittaker five Kingdom classification	Q4- Remembering, understanding- Examining and Categorizing

D.K. Govt. College for Women (A), Nellore

Department of Microbiology

Mapping of course outcomes with learning outcomes, 2021-22

Microbiology – Paper –II : Microbial physiology and biochemistry

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper –II :Microbial physiology and biochemistry	CO1. Understand the structure, function and classification of carbohydrates, Amin acids and lipids	Carbohydrates Lipids Amino acids	Q1- Remembering, understanding- Categorizing
	CO2. Understand the protein structure, function and classification.	Protein structure, function and sequencing methods	Q2- Remembering, understanding- Exemplifying, Categorizing, Drawing
	CO3. Understand the enzymes catalytic and inhibition activity	Enzymes properties and functions Catalytic activity Inhibition activity	Q3- Remembering, understanding- Identifying
	CO4. Understand the Nucleic acids (DNA&RNA)	Nucleic acids structure and functions Types	Q4- Remembering, understanding- Exemplifying, Identifying Categorizing and Drawing
	CO5. Know the Aerobic and anarobic respirations	Glycolysis Emp pathway Citric acid cycle Lactic acid TCA cycle	Q5- Remembering, understanding- Exemplifying and Categorizing

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.

II B. Sc - SEMESTER–III: Microbiology THEORY PAPER, 2019-20

Paper-III : Immunology and medical microbiology

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
PAPER III. Immunology and medical microbiology	**CO1. Acquire and know about** 1.Types of immunity 2.primary and secondary organs of immune system 3.cells of immune system **CO2. Acquire and know about** 1.Antigen structure and functions 2.Antibody structure and functions 3.Antgen & Antibody reactions 4.Hybridoma technology **CO3. Understand** Normal flora of human body,hostpathogenic interactions, Nosocomial infections. **CO4.Analyze and acquire knowledge about different types of microbial diseases** **CO5.understand the chemotherapy** **Disc diffusion and MIC method** **Antimicrobial drugs and interferons**	1.Immunity Primary and secondary organs of immune system Cells of the immune system 2.Types of Antigens and Antibody structures and functions Labelled antigen and Antibody reactions Monoclonal and polyclonal antibodies 3.Principles of laboratory and diagnostic microbiology 4.Bacteria,fungi,virus,protozoan diseases 5.principles of chemotherapy Anti bacterial,fungal,viral drugs, types of interferons and inducers	Q1- Remembering, understanding- Exemplifying, Identifying Categorizing Q2- Remembering, understanding- Categorizing, grouping and determining 3 Remembering, understanding- Identifying Q4-Remembering, understanding- Exemplifying, Identifying 5- Remembering, understanding- Exemplifying, Identifying , Observing .

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE

II B.Sc. Microbiology,SEMESTER- IV,

PAPER –IV: Industrial microbiology

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
PAPER –IV: Industrial microbiology	**CO1. Acquire knowledge about strain improvement techniques, industrial important microoganisms**	1. Primary and secondary screening techniques & primary and secondary metabolites	Q1- understanding-Exemplifying, estimating
	CO2. Acquire knowledge and know about different fermentation techniques	**2.types of fermentation techniques , ingredients and downstream process**	Q2. Remembering Understanding-Exemplifying, estimating
	CO3. Understand the structure and types of bioreactors, sterilization of bioreactors	3.Structure of bioreactors, Types of bioreactors , sterilization, aeration and agitation of bioreactors	Q3 understanding-Exemplifying, estimating
	CO4.Analyze and acquire knowledge about principles of production media, production of ethanol, citric acid, penicillin &vit B12	4. **Microbial production of industrial products**	Q4- Remembering, understanding-Exemplifying, estimating

	CO5. Acquire and know the importance of microbial enzymes ,amylase,protease,therapeutic enzymes,bioleaching	microbial enzymes production,uses and bioleaching.	Q5- Knowledge, understanding. Analysis - observation and evaluation.

D.K. Govt. College for Women (A), Nellore

Department of Microbiology

Mapping of course outcomes with learning outcomes, 2021-22

Microbiology –Paper-V:Molecular biology and Microbial genetics

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Paper-V: Molecular biology and Microbial genetics	CO1. Understand the DNA and RNA as genetic materials, replication of DNA,	DNA and RNA as genetic materials,extrachromosomal material Replication of DNA	Q1-Remembering, understanding-Exemplifying, Drawing
	CO2. Understand the types of genes,lac operon concept,	Types of genes, Regulation of gene expression.	Q2- Remembering, understanding-Exemplifying

	CO3. Analyze and understand the mutagens, mutations, transformation, conjunction and transduction	Mutations,DNA damage repair mechanism	Q3- Understanding-Analysis Remembering
	CO4. Understand the transcription and translation	Outlines of transcription and translation	Q4- Remembering, understanding-Exemplifying
	CO5. Acquire knowledge about PCR, DNA polymerasses,gene cloni ng methods	Basic principles of genetic engineering	Q5- Remembering, understanding, Applying-Experimenting

D.K. Govt. College for Women (A), Nellore
Department of Microbiology. 2021-22
Mapping of course outcomes with learning outcomes
Semester –VI, Paper-VII-C:: Elective paper:
:Instrumentation and biotechniques

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes

Paper-VII-C instrumentation and biotechniques	CO1. Understand the Basic concepts of bright field microscopy,dark field microscopy, fluorescence,phase contrast microscopy	1. Different types of microscopes	Q1. Remembering, understanding, Applying- Drawing, Experimenting,
	CO2. Acquire knowledge about the principles and applications of chromatography	2.principles of paper,thin, columns chromatography and applications	Q2- Remembering, understanding, Applying- Drawing, Experimenting, Estimating, Observing.
	CO3. Understand The principles and applications of electrophoresis	3.PEG,SDS PAGE 2D ge electrophoresis	Q3-Analysis, evaluation. Application Knowledge
	CO4.Acquire and know Principles of spectrophotometry	Principles and applications of spectrophotometer and turbidometry	Q4-Knowledge/ recall and understanding Remembering
	CO5. Analyze and know the concept of centrifuge and types of centrifuge	RCF,preparative and analytical ,density gradient centrifugation	Q5- Knowledge, understanding. Analysis- Identifying and evaluation.

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D.K. Govt. College for Women, Nellore
Department of Statistics
Mapping of course outcomes with learning outcomes
Department of Statistics 2021-22

Name of the Semester/Course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
SEMESTER-1 Descriptive statistics Paper I	CO1 : To through light on the role of statistics in different fields with special reference to business and economics.	Importance, Scope of statistics	1. Knowledge/Understanding
	CO2 : Students to review good practice in presentation and format most applicable to their own data	Concepts of Primary and Secondary data	2. Understanding, Analysis & Applications
	CO3 : The measures of Central Tendency reduce the data to a single value	Measures of Central Tendency	3.Application
	CO4 : The measures of dispersion through light on reliability of average	Dispersion, Moments, Skewness, Kurtosis	4.Knowledge / Application
	CO5 : The concepts of correlation and regression deals with studying the linear relationship between two or more variables to analyse the real life problems	Correlation and Regression for Bi variate data-properties and applications	5.Application, Evaluation and Synthesis
	CO6: The attributes gives an idea how to deal with qualitative data	Theory of Attributes	6.Analysis
SEMESTER 2 Probability Theoy & Distributions Paper II	CO1:To learn how to deal uncertainty situation	Probability	1.Understanding, Knowledge
	CO2:To learn how to measure uncertainty	Random Variables & Mathematical Expectations	2.Knowledge, Application
	CO3: To get an idea about various standard theoretical distributions & Characteristics , Applications	Theoretical Discrete and Continuous distributions	3.Application, Synthesis

SEMESTER 3 Statistical Inference- Paper III	CO1: To learn the concepts of Exact Sampling distributions & terminology of population and Sample	t, F, Chi Square distributions	Knowledge/ recall and understanding
	CO2: To learn how to draw conclusion about population on the basis of sample	Theory of Estimation	Understanding, Application
	CO3: To understand the Characteristics of good estimator and the concepts in estimation theory	Concepts of Unbiassedness, Consistency, Effeciency, Sufficiency	Knowledge, Understanding
	CO4: To Construct confidence intervals	Interval estimation	Application
	CO5: To learn how to develop the most powerful test	Testing of Hypothesis	Evaluation, Knowledge Synthesis
	CO6: To learn the importance of Large and Small Sample Tests	Large, Small sample tests & Non parametric tests	Application, Synthesis
SEMESTER 4 Sampling Techniques &Design of Experiments- Paper IV	CO1: To learn the ways and methods to draw samples for optimum results	Sampling Techniques	1.Knowledge/Recall/ Understanding/Evaluation/ Application
	CO2: To understand the variability between groups and within groups through ANOVA	Analysis of Variance	2.Understanding/Evaluation Application
	CO3: To get an idea on logical construction of experimental designs and its applications	Design of Experients	3.Application/Anaysis
	CO4: To learn how multiple factors effect dependent variable through factorial designs	Factorial Experiments with Main & Interaction effects	4.Application/Analysis Evaluation
SEMESTER 4 Applied Statistics	CO1:To understand Time Series Analysis &	Time Series Analysis- Trend, Seasonal Variations	Recall & Application

Paper-V	forecasting the future values		
	CO2:To learn the applications of index numbers in practical situations & their limitations	Index numbers	Evaluation & Application Synthesis
	CO3:To enlight the students for obtaining various Mortality & Fertility rates	Vital Statistics	Application, Understanding Analysis
	CO4: To learn the construction of life tables and estimating population growth	Life tables & their construction	Synthesis, Application / Understanding/Analysis

SEMESTER 5 **Sampling Techniques and Design of Experiments Paper V**	CO1 : To analyze how to enumerate population census calculations. CO2: To remember probability applications in sampling theory. CO3 : To examine Non probability applications in sampling theory. CO4 : To perform the appropriate analysis of comparative experimental units. CO5: To perform the Anova for finding missing observation in a plot.	1. Sampling Theory: Principle steps in a sample survey, Censes versus sample survey, sampling and Non-sampling errors. 2. Simple Random Sampling: Meaning of Samples and methods to draw. 3. Analysis of Variance: One way with equal and unequal classifications and two way classifications 4. Design of Experiments: Principles of experimentation in Designs, 5. Design of Experiments: RBD and LSD	1. Knowledge/ recall and understanding, Evaluation/application . 2. Evaluation/analysis application 3. Understanding /evaluation/applicat ioon. 4. Application understand/analysis 5. Evaluation/analysis application,
Quality & Reliability Semester V Paper VI	CO1 : To assess the quality of each commodities. *CO2; To evaluate conformity of goods before delivery from an industry.* CO3 : To analyze reliable raw goods from an industry.	1. Importance of SQC in industry, statistical basis of shewart control charts, uses of control charts. 2. Attribute control charts- np, p- charts, C chart 3. Acceptance sampling plans	1. Application Understand/analysis 2. Evaluation/analys is Application 3. Knowledge/ and understanding, Evaluation/applic ation

	CO4: To take a decision about accept or reject lot using sampling plans. CO5 : By implementing probability theory to examine reliability. CO1 : To analyze	4. Rectifying inspection plans: Single and double sampling plans OC and ASN functions of SSP and DSP. 5.Reliability: Introduction, failure rates, Hazard function, estimation of reliability, exponential distribution as life model 1. **Analysis of times series**:	4.Understanding /evaluation/applicatioon., Synthesises, 5.Understanding/Knowledge/Application. 1. Knowledge/
Applied Statistics Semester VI PaperVII	chronological data for understanding forecasting behavior . CO2: To observe economical booms in any business sector. CO3 : To analyze Dearness allowance and cost of living index To interpret Purchasing power of money using market commodity prises. CO4 : To assess Birth and Death rates and to analyze reproduction rates for population growth. Co5: To estimate the population starting from birth to death till the end and also to frame the National Income and GDP.	Components of times series: meaning and examples, trend . 2. **Index numbers:** Meaning, problems involved in the construction of index Meaning, problems involved in the construction of index numbers 3. Cost of living index numbers, wholesale price index numbers 4. **Vital statistics**: Meaning, Definition **Reproduction Rates:** Birth rates - CBR,ASFR,GFR,TFR Measurement of population growth, 5. Life Tables , concept of Official Statistics	recall and understanding, Evaluation/application 2. Evaluation,application 3. Understanding /evaluation/application 4. Application, Understanding /analysis 5. Synthesises, Application, Understanding /analysis

Optimization Techniques & Numerical Analysis SemesterVI (Paper VIII C1 & C2)	CO1: To understand optimization techniques using OR tools. CO2: To acquire knowledge regarding Slack, Surplus and Artificial variables. CO3: To evaluate shortest route which covers all destinations of Travelling salesman. CO4: To interpret minimum cost of transporting item from Source and Destination. CO5: To Estimate the missing values. CO6: To evaluate the definite integral value CO7: To forecast the future value.	**Linear Programming Problem:** Introduction, Mathematical formulation of the LPP, Canonical and standard form of LPP **Solution of LPP:** Definitions of BFS, IBFS, Degenerate solution, Slack and Surplus variables, Optimum solution, Computational procedure of Simplex method , Big-M method The travelling salesman problem **Transportation Problem:** Introduction, Transportation Table, General Transportation problem Initial basic feasible solution(IBFS) **Finite Differences:** Definitions of operators Δ, ∇ and E, - Properties - Relationship among operators- Difference Table- Uses- Estimation of single and Two Missing values **Numerical Integration:** Importance- General Quadrature rule- Trapezoidal Rule- Simpson's -1/3 Rule- Simpson's -3/8 Rule Interpolation in unequal intervals- Lagranges formula	1. Understanding /evaluation/application/ Synthesises, 2. Evaluation,application 3. Evaluation,application, Synthesises, 4. Understanding/Application, Synthesises, 5. Knowledge/ recall and understanding, Synthesises, Evaluation/application 6. Analysis/Application , Synthesises, 7. Analysis/Application, Synthesises,

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – I – Fundamentals of Accounting

B.Com (CA and General)

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
I B.COM Fundamentals of accounting	CO 1: Acquire knowledge about general aspects of business operations and about to learn accounting information system and its limitation	Introduction of Fundamentals of Accounting	Learning of entries as per accounting principals
	CO 2: Learn the concepts and procedures of financial reporting including income statement, balance sheet and etc.,	Calculation of Gross profits and net profits of the business & balance sheets.	Learning of year wise financial status of the business
	CO 3: Ability to tabulate the financial data and analyzing data from annual reports of the firm	Computerization of accounting system	Learning of latest techniques in computerization of accounts.

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – I – Business Organization and Management

B.Com (CA and General)

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
I.B.COM Business organisation and management	CO 1: Understand the basic development of entrepreneurship as a profession.	**Unit-I** Features and functions of business, trade & industries	Learning formation of business, factors influencing the organizations
	CO 2: Ability to understand business models	**Unit-II** Features and merits of various entrepreneurship	Learning of formation of different business forms.
	CO 3: Understand to write a business plan describing a new venture and monitor the performance of a new firm	**Unit-IV** Characteristics & Principals of management	Learning how to manage the business forms & managing systems
	CO 4: Identify capital resources for new ventures and social responsibility of business manager	**Unit-V** Functions of management, planning & principals of management	Learning how to organize the resources in the organizations

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – I – Business Environment

B.com (General)

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
I.B.COM **Business Environment**	Co1: to develop business strategies that respond to emerging opportunities and challenges in the global environment.	**Unit-I** Overview of business environment	Learning of influencing factors and swot analysis of business environment.
	Co2: able to plan the financial frames work with particular application to the transaction of business	**Unit-II** Economic environment	Learning the structure of economy & economic conditions of the business
	Co3: understand the effect of Government police on the economic policies and insurance industries.	**Unit-III** Economic policies	Learning of new economic policies, objectives & limitations
	Co4: to understand the concept of business ethics.	**Unit-IV** Social environment	Learning the Concept of Social responsibilities & their impact in the society
	Co5: analyze the environment of the business from the legal and regulatory, macro economics and cultural, political technological and natural perspectives	**Unit-V** Global Environment	Learning of economical & Political effect in the Global business

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – II – Financial Accounting

B.com (CA and General)

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
II B.Com Financial Accounting	CO 1: Understand to act on consignment and identify the agents to custody of any material but retaining the legal ownerships unit selling of goods.	**Unit- IV Consignment Accounts**	Leaning the business model on commission base
	CO 2: acquire knowledge about preparation of business debts bills and calculation of depreciation on assets at the time	**Unit - I Depreciation of Accounts**	Learning the calculation of net present values of the assets and how to keep the funds aside.
	CO 3: able to know joint venture business entity created by two or more partners by shared ownership.	**Unit- V Joint venture accounts**	Learning the process of Joint Venture Business

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – II

B.com (CA and General)

Paper – Business Economics

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
	CO1: To describe the nature of economics in dealing with the issues of scarcity of resources	**Introduction of Business Economics**	Learning the Maximum utilization of natural resources
	Co2: analyze supply demand analysis and its impact on consumer behavior	**Demand analysis**	Learning the market influences on the products
	Co3: evaluate the factors such as production and cost affecting firms behavior	**Production, Cost & revenue analysis**	Learning the behavioural management in the business forms
	Co4: recognize market failure and the role of government in dealing with those failures	**Market Structure**	Learning the Governing policies in the markets.
	Co5: use economic analysis to evaluate controversial issues and policies	**National Income**	Learning how to measure the national income & GDP.

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – II

B.com (General)

Paper – Banking Theory and Practice

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
I B.COM Banking Theory and Practice	Co1: to make the students aware of Indian banking system.	**Introduction of banking system**	Learning various banking structures in India.
	Co2: to enables students to understand the reforms and other development in the Indian banking	**Banking Systems**	Learning various banking systems in India.
	Co3: to impact knowledge about functions and role of reserve bank of India.	**Types of Banks**	Learning policy systems of RBI in India.
	Co4; to enlighten the student's knowledge on banking regulation act.	**Banking Systems**	Learning about regulation act on banking system.
	Co5: to give knowledge on Indian banking system and Acts pertaining to it.	**Banking Systems**	Learning about Indian Banking systems.
	Co6: to provide understanding of nature, importance of banking sector.	**Banking Systems**	Learning about importance of banking sector.

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – III

B.com (CA and General)

Paper – advanced Accounting

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
II.B.Com **Advanced Accounting**	Co1: to provide the knowledge of various accounting concepts.	**Royalty & hire purchases**	Learning the Procedures of Royalty & Hire Purchases
	Co2: to impart the knowledge about accounting methods procedures and techniques	**Partnership's**	Learning the Procedures & accounting systems of partnership business
	Co3: to acquired students with practical approach.	**Dissolution of Partnership**	Learning the Procedures & accounting system of Dissolution of partnership business

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – III

B.com (CA and General)

Paper – Business Statistics

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
II.BCOM Business Statistics	CO1: independently calculate basic statistical parameters (mean, measures of dispersion, correlation, coefficient, indexes)	**Measures of Central tendency**	Learning of average results of Statistical data's
	CO 2: Ability to take good decision making in the uncertainty and applied in the business settings as statistician.	**Correlation**	Learning the Correlation between two or more values
	CO 3: Assess the quality assurance, financial analysis and predicting the future of the business duly applying the business statistics	**Measures of Dispersions**	Learning the absolute and relative measures.
	CO 4: Able to gather the business information and analyze comparatively and applied relative changes in magnitude of a phenomenon	**Measures of Relations**	Learning about relation of two results

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – IV

B.com (CA) – Corporate Accounting

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
II.BCOM **Corporate Accounting**	CO 1: Understand the accounting system of company's analysis and interpretation of company's capital structure good will methods	**Accounting for Share Capital**	Learning about Capital Structure
	CO 2: Ability to do as stock broker to revaluate the share value of a company and it useful for purchasing of stocks of the companies and sale of securities.	**Valuation of Shares**	Learning different methods in valuation of shares
	CO 3: Analyzing the company balance sheets for taking decision for purchase of stocks or amalgamation and able to prepare consolidate financial statements while using he accounting techniques and mange the day to day finances of a company's.	**Company final accounts**	Learning about Provisions companies Act 2013

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – IV

B.com (CA) – Business Laws

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
II.B.COM Business Laws	CO 1: Identify the elements of a contract Understand to make skill of business contracts and know about the procedure of laws and rules.	**Contract**	Learning about various elements of Contracts
	CO 2: Develop a business skills how to buy and sell the properties what are the law rules of breachment of contracts to know the rules of law related to unpaid vendor.	**Contract of sale**	Learning about sales & agreements
	CO 3: Know the online transaction and online sales safety through cyber act and procedure of digital signatures.	**Cyber Law**	Learning about Cyber Law Act
	CO 4: understand some basic strategies that can be used to solve legal problems.	**Contract Law**	Learning about Mercantile Law

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – IV

B.com (CA) – Income Tax

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
II B.COM Income Tax	CO 1: Enable the students to identify the basic concepts, definitions and terms related to income tax.	**Introduction to Income Tax**	Learning about the procedure of Income Tax Act 1961
	Co 2: Students would determine the residential status of an individual and scope of total income tax	**Personal Income Tax**	Learning about the Personal Income tax & Payment of Taxes
	Co4: Students would compute income from salaries, housing property, business/ profession, capital gains and income from other sources.	Income from Salary	Learning how to calculate different types of Income Taxes.

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – IV

B.com (CA) – Cost and Management Accounting

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
III B.COM Cost and Management Accounting	CO 1: to understand various costing systems and management systems.	**Introduction of Costing**	Learning about the calculation of cost of production of a unit
	Co2: analyze and provide recommendation to improve the operations of organization through the applications of cost and management accounting techniques.	**Calculation of Materials**	Learning about the raw material cost
	C03: evaluate the costs and benefits of different conventional and contemporary costing systems.	**Costing Systems**	Learning about Calculations of overhead charges for a unit
	C04: differentiate methods of schedule costs as per unit of production	**Methods of Costing**	Learning about the calculation of contract costing

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – V

B.com (CA & GENERAL) – Goods and service tax Fundamentals

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
III B.COM Goods and service tax Fundamentals	CO 1: Identify the taxation procedure of the central Govt. and state Govt. and ability to follow latest taxation procedures i.e., GST and apply in business	**Introduction of GST**	Learning about the New tax system-GST
	CO 2: understand the taxation system in other countries.	**Tax Systems**	Learning about the GST System adopting from other countries
	CO 3: Identify the other taxes and duties outside preview of GST and central and customs duties	**Tax System in India**	Learning about the different tax system in India

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – V

B.com (CA & GENERAL) – Advanced accounting:

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
III B.COM **Advanced accounting**	CO1: Know how to do agreements and business trends of lease and self balance system.	**Royalty & hire purchases**	Learning the Procedures of Royalty & Hire Purchases
	CO 2: Learn how to manage financial sources and how to revaluate the business assets at the time of partner join death etc.	**Partnership's**	Learning the Procedures & accounting systems of partnership business
	CO 3: Ability to classify and recalculate the assets and liabilities of a company financial position at the time of liquidation.	**Dissolution of Partnership**	Learning the Procedures & accounting system of Dissolution of partnership business

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – V

B.com (CA & GENERAL) – Business leadership

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
III B.COM **Business leadership**	CO 1: Became great managerial leaders and lead the business environment in a successful manner	**Introduction of Leadership**	Learning about Leadership qualities**.**
	CO 2: Able to learn how to fix the targets, aims and objectives of a company as a managerial leader.	**Decision making**	Learning about the abilities of Leaders

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – VI

B.com (CA & GENERAL) – Management accounting

Name of the course	**Course outcomes**	**Lessons/units/topics**	**Assessment as per Blooms learning outcomes**
III B.COM Management Accounting	CO 1: Able to know how to prepare financial statements of the company and know about the monetary strength of the company.	**Financial Statements**	Learning about the comparison of financial statements of different years
	CO 2: Understand the financial strength of the companies and its insolvency position of a company through ratio analysis and funds flow statements.	Ratio Analysis	Learning about the financial position of the company & its insolvency positions

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – VI

B.com (CA & GENERAL) – AUDITING

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
AUDITING	CO 1: Understand the value of auditing and its need to the company for maintaining accounting.	**Introduction of auditing**	Learning about the importance of auditing to the companies
	CO 2: Able to know how to identify and rectify the mistakes committed by the accountants in the companies	**Auditors Report**	Learning about how to Verify the accounts & its vochures.

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – VI

B.com (CA & GENERAL) – Event Management:

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
Event Management	CO 1: Understand how to create an event that achieves specific objecting for the host or client.	**Event Concept**	Learning about the various types of events.
	CO 2: Design a planning process that incorporates budgeting project management communication and evaluation tools.	**Outdoor events**	Learning about the budgeting of the outdoor & celebrity events

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE

DEPARTMENT OF COMMERCE

Mapping of course outcomes with learning outcomes, 2021-22

Semester – VI

B.com (CA & GENERAL) – ADVANCED COST ACCOUNTING

Name of the course	**Course outcomes**	**Lessons/units/topics**	**Assessment as per Blooms learning outcomes**
ADVANCED COST ACCOUNTING	CO1: After completion of the course the student will be able to demonstrate through knowledge of processes used to determine product costs.	Reconciliation statement	Learning about the Production cost & profit earnings
	CO2: student will be able to interpret cost accounting statements.	**Operating costing**	Learning about the analysis of operating costing
	CO3: the students will be able to analyze and evaluate information for cost ascertainment	**Standard costing & Budget costing**	Learning about how to calculate the budgets for the units

Department of Hindi

Mapping of course outcomes with learning outcomes, 2021-22

General Hindi– Paper- I:

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
	CO1: Understanding and develop the values which are needed in human life.	Thakur ka kuva	Remembering, Understand
	CO2: To improve the language skills through listening, speaking, reading and writing. Prose lessons of great writers like to develop an in-depth knowledge and values.	**Hajari Prashad, Dvivedi, Balakrishn Bhatt and Nadhduleri Vajpey**	Understand, Apply
	CO3: Able to understand the importance of humanity and responsibility through short stories	**thakurka kua, vapasi** and **sad achar ki tavij.**	Understand, Apply, Analyze
	CO4: To utilize digital literacy tools to develop grammar skills.		Apply, Evaluate, create
	CO5: Set acquainted with official terminology in Hindi language		Create, Apply

Mapping of course outcomes with learning outcomes, 2021-22
General Hindi – Paper- II:

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
	CO1: To understanding the greatness of India regarding unity in diversity and about relationship between culture and literature.	Bharat me samskruthi Sangam	Understand, Analyze
	CO2: To understand the importance of time.	Samay per melnevale.	Understand, Apply
	CO3: To understanding human values through the short story to help the needy and poor people in the society.	**(Har ki Jeeth),**	Understand, Apply
	CO4: To understanding the problems facing by old age people in the society through the short story	**Seva.**	Understand, Apply, Analyze
	CO5: To understanding about patriotism through the short story	**Puraskar**	Remember, Understand
	CO6: To develop grammatical skills through prepositions to know the meaning and sentence writing in Hindi.	vyakaran	Understand,Remember,Apply,Analyze
	CO7: To produce appropriate vocabulary and correct form to improve skills in the letter writing.	Letter Writing	Create, Apply

Department of Telugu
Mapping of course outcomes with learning outcomes, 2021-22
General Hindi – Paper- III : KAVYDEEP

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
	CO1: To understand the moral values and life skills taught indirectly through poems	**(Bhikshuk, aage bado-unche chado, charan chale imaan achal ho)**.	Apply,Evaluate
	CO2: understanding the concept of history of Hindi literature.	History of Hindi Describing the progressive nature of sant kabeer and his writings. Describing the sufi writings (jayasi). Describing the sri Krishna bal varnan by the writings of the surdas. Literature.	Understand, Analyze
	CO3: To develop creative thinking by writing the general essays.	General Essays-Pradushan ka tara,Nari shiksha ka mahatav,Swacha Bharat,Visva bhasha ke rup may Hindi	Apply,Create
	CO4: To understand the translation skills.	Translation Hindi-English	Understand,Create,Apply
	CO5: To acquire skills of drafting official letters in Hindi like circular, notification and office memorandum	Karyalayi Patrachar	Understand,Create,Apply

DEPARTMENT OF ENGLISH

Mapping of Course Outcomes with Learning Outcomes 2021-'22

Name of the Course	Course Outcomes	Units/Topics	Assessment as per Blooms Taxonomy
Paper-I	CO1 :Importance of listening, classification and effective ways of listening	Unit-1: Listening Importance, types and barriers to listening	Q-1 Know the difference between listening and hearing, understand and appreciate the process of listening
	CO2: Sensitize to the nuisances of English speech sounds, word accent and rhythm	Unit-2: Sounds of English Word Accent Intonation	Q-2: Improve the fluency in Spoken English and neutralize mother tongue influence. Select, compile and synthesize information for an oral presentation.
	CO3: Use grammar effectively in writing and speaking.	Unit-3 Grammar Concord, Modals, Tenses, Articles, Prepositions, Q.Ts, Errors	Identify and correct the errors in Concord, Applying the rules of grammar
	Co4: Able to differentiate between common punctuation marks, identify prefixes and suffixes.	Unit-4: Writing Punctuation, Spelling and Paragraph Writing	Demonstrate the use of good vocabulary, develop their spelling ability, identify their written strengths and weaknesses.
	CO5: Acquire ability to use soft skills in professional and daily life, Confidently use the tools of communication skills	Unit-5: Soft Skills SWOC, Attitude, Emotional Intelligence, Interpersonal Skills	Be aware if their self-confidence, values, strengths and weaknesses through self-analysis, learn to improve a positive attitude,

			Understand and handle emotions of self and others.

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Department of Telugu

Mapping of course outcomes with learning outcomes, 2021-22

Telugu– Paper- I: జనరల్ తెలుగు సెమిస్టర్ -1

కోర్సు -1 : ప్రాచీన తెలుగు కవిత్వం

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
జనరల్ తెలుగు సెమిస్టర్ -1 కోర్సు -1 : ప్రాచీన తెలుగు కవిత్వం	1. ప్రాచీన తెలుగు సాహిత్యం యొక్క ప్రాచీనతను, విశిష్టతను గుర్తిస్తారు. తెలుగు సాహిత్యంలో ఆదికవి నన్నయ కాలంనాటి భాషా సంస్కృతులు, ఇతిహాస కాలంనాటి భాషా సంస్కృతుల గురించి తెలుసు కుంటారు. రాజనీతి విషయాలపట్ల పరిజ్ఞానాన్ని సంపాదించగలరు.	రాజనీతి	అర్థం చేసుకొ గుర్తుంచుకో
	2. శివకవుల కాలంనాటి మత పరిస్థితులను, భాషా విశేషాలను గ్రహిస్తారు. తెలుగు నుడికారం, సామెతలు, లోకోక్తులు మొదలైన భాషాంశాల పట్ల పరిజ్ఞానాన్ని పొందగలరు.	.దక్షయజ్ఞం	అర్థం చేసుకొ గుర్తుంచుకో
	3. తిక్కన భారతంనాటి మత, ధార్మిక పరిస్థితులను, తిక్కన కవితాశిల్పాన్ని, నాటకీయతను, అవగాహన చేసుకోగలరు.	దౌమ్యుని ధర్మోపదేశం	అర్థం చేసుకొ గుర్తుంచుకో
	4. ఎఱ్ఱన సూక్తి వైచిత్రిని, ఇతిహాస కవిత్వంలోని విభిన్న రీతులపట్ల అభిరుచిని పొందగలరు. శ్రీనాథుని కాలంనాటి కవితా విశేషాలను, మొల్ల కవితా విశిష్టతను గుర్తించగలరు.	పలనాటి చరిత్ర , మొల్ల రామాయణం	సృష్టించు

	5. తెలుగు పద్యం స్వరూప స్వభావాలను, సాహిత్యాభిరుచిని పెంపొందించుకుంటారు. ప్రాచీన కావ్య భాషలోని వ్యాకరణ అంశాలను అధ్యయనం చేయడం ద్వారా భాషా సామర్థ్యాన్ని, రచనలో మెళకువలను గ్రహించగలరు	వ్యాకరణం	పరీక్షించు, విశ్లేషించు, అనువర్తించు
జనరల్ తెలుగు - సెమిస్టర్-2 కోర్సు-2 : ఆధునిక తెలుగు సాహిత్యం	1. ఆంగ్లభాష ప్రభావం కారణంగా తెలుగులో వచ్చిన ఆధునిక సాహిత్యాన్ని, దాని విశిష్టతను గుర్తిస్తారు.	ఆధునిక కవిత్వం కొండవేడు,మాతృసంగీతం,తాతకో నూలుపోగు	అర్థం చేసుకొ ,గుర్తుంచుకో, సృష్టించు
	2. సమకాలీన ఆధునిక సాహిత్య ప్రక్రియలైన “వచన కవిత్వం, కథ, నవల, నాటకం, విమర్శ” లపై అవగాహన పొందుతారు.	తెలుగు కథానిక,నవల,నాటకం .	అర్థం చేసుకొ ,గుర్తుంచుకో, సృష్టించు
	3. భావకవితా అభ్యుదయ కవితాలక్ష్యాలను గూర్చిన జ్ఞానాన్ని పొందుతారు, అస్తిత్వవాద ఉద్యమాల పుట్టుకను, ఆవశ్యకతను గుర్తిస్తారు.	ఆధునిక కవిత్వం ,విమర్శ	అర్థం చేసుకొ ,గుర్తుంచుకో, సృష్టించు
	4. కథాసాహిత్యం ద్వారా సామాజిక చైతన్యాన్ని పొందుతారు. సిద్ధాంతాల ద్వారా కాకుండా, వాస్తవ పరిస్థితులను తెలుసుకోవడం ద్వారా కాకుండా, వాస్తవ పరిస్థితులను అర్థం తెలుసుకోవడం ద్వారా సిద్ధాంతాన్ని సమీక్షించగలరు	ఆధునిక కవిత్వం ,విమర్శ తెలుగు కథానిక,నవల,నాటకం	అర్థం చేసుకొ ,గుర్తుంచుకో, సృష్టించు
	5. ఆధునిక తెలుగు కల్పనా సాహిత్యం ద్వారా సామాజిక, సాంస్కృతిక, రాజకీయ చైతన్యాన్ని పొందుతారు.	విమర్శ	పరీక్షించు విశ్లేషించు

Special Telugu– Paper- I: స్పెషల్ తెలుగు సెమిస్టర్ -1

కోర్సు -1 : ప్రాచీన కవితా పరిచయం

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
స్పెషల్ తెలుగు సెమిస్టర్ -1 కోర్సు -1 : ప్రాచీన కవితా పరిచయం	1. ప్రాచీన తెలుగు కవితా సౌందర్యాన్ని, విశిష్టతను గుర్తిస్తారు. తెలుగుజాతి సంప్రదాయాలను గ్రహిస్తూ, తెలుగువారి సంస్కృతిలో ఒక భాగమైన తెలుగు పద్యకవిత్వం వికాసం చెందిన విధానాన్ని విశ్లేషణాత్మకంగా అవగాహన చేసుకోగలరు.	నాడీ జంఘో పాఖ్యానం ప్రహ్లాద చరిత్ర,అశోకవనంలో జానకి	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు
	2. మార్గకవితకు వ్యతిరేకంగా తలెత్తిన దేశికవిత్వోద్యమాన్ని అవగాహన చేసుకుంటారు. శివకవుల కాలంనాటి మత, ధార్మిక పరిస్థితులను, భాషావిశేషాలను గ్రహించగలరు.	.బెజహమహాదేవి కథ	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు
	3. తిక్కన మహాభారత రచనా విశిష్టతను గ్రహిస్తూ, అందులోని కావ్యశిల్పం ద్వారా రసానుభూతిని పొందగలరు. ఉపాఖ్యానాలలోని సందేశాన్ని గ్రహిస్తూ, గ్రాంథికభాష రూపుదిద్దుకున్న క్రమాన్ని గుర్తించగలరు.	నాడీ జంఘో పాఖ్యానం	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు
	4. మార్గకవిత ప్రబంధ ప్రక్రియలోకి పరిణమించిన పైనాన్ని తెలుసుకుంటారు. ప్రబంధయుగ విశిష్టతను, అల్లసాని కవితలోని జిగిబిగిని ఆస్వాదించగలరు. కావ్యవస్తువులో కాలానుగుణంగా వచ్చిన మార్పులు గ్రహించగలరు.	.బెజహమహాదేవి కథ	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు

	5. పోతన భాగవత విశిష్టతను, భక్తితత్వాన్ని అర్థం చేసుకోగలరు. మొల్ల రామాయణంలోని కవితా చమత్కారాన్ని, కావ్యేతిహాస ప్రక్రియా విశిష్టతను, శబ్దసౌందర్యాన్ని గ్రహించగలరు.	ప్రహ్లాద చరిత్ర	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు

Special Telugu – Paper- II : స్పెషల్ తెలుగు సెమిస్టర్ -2

కోర్సు -2 : ఆధునిక కవితా పరిచయం

Name of the course	Course outcomes	Lessons/units/topics	Assessment as per Blooms learning outcomes
ఆధునిక కవితా పరిచయం	1. వర్తమాన తెలుగు జీవనంలో ఒక భాగమైన ఆధునిక తెలుగుకవిత్వం తీరు తెన్నులను, సౌందర్యాన్ని విశ్లేషణాత్మకంగా అవగాహన చేసుకోగలరు.	జన్మభూమి	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు
	2. దేశభక్తి, సామాజిక అసమానతల నివారణ, మానవతావాదం మొదలైన భావాలను పెంపొందించుకోగలరు.	వేమన .	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు పరీక్షించు, విశ్లేషించు, అనువర్తించు
	3. సున్నితమైన భాషను ఉపయోగిస్తూ, ఉత్తమభావాలను ప్రకటించే సామర్థ్యాన్ని అందుకోగలరు.	వేమన, గబ్బిలం	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు

	4. వ్యవహారికభాషలో సామాజిక చైతన్యాన్ని ప్రోత్సహించే కవిత్వం రాయడానికి ప్రేరణ పొందగలరు.	అమృతం కురిసిన రాత్రి , భిక్షువర్షియసి	అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు
	5. ఆధునికకాలంలో కవితల్లోను, వస్తువులోను, భావంలోను వచ్చిన మార్పులను గ్రహించగలరు. శిల్పంలో స్వేచ్ఛను, భావప్రకటనలో వచ్చిన మార్పులను, సమాజానికి భాష దగ్గర కావడాన్ని అవగాహన చేసుకోగలరు.	వేమన, గబ్బిలం	పరీక్షించు, అర్థం చేసుకొ, గుర్తుంచుకో, సృష్టించు విశ్లేషించు, అనువర్తించు