

**THEIVANAI AMMAL COLLEGE FOR WOMEN
(AUTONOMOUS)
VILLUPURAM**
(Re-Accredited by NAAC with 'A' Grade & ISO 9001:2008 Certified)
(A UNIT OF E.S.S.K. EDUCATIONAL CHARITIES)



**ACADEMIC COUNCIL BOOKLET – VIII
Arts , Science and IQAC (Master Copy)**



21st June 2016

Department of Biochemistry

- B.Sc Biochemistry
- M.Sc Biochemistry

Department of Chemistry

- B.Sc Chemistry
- M.Sc Chemistry

Department of Mathematics

- B.Sc Mathematics
- M.Sc Mathematics

Department of Physics

- B.Sc Physics
- M.Sc Physics

Department of Computer Science

- B.Sc Computer Science
- M.Sc Computer Science

Department of Computer Application & ISM

- Bachelor of Computer Applications
- Master of Computer Applications

DEPARTMENT OF BIOCHEMISTRY

Preamble

UG: Course Profile, list of courses offered to other departments & the syllabi of courses offered in the third and fourth semesters along with evaluation components III & IV (with effect from 2015-2018 batch onwards) and

PG: Course Profile, list of courses offered to the other departments & syllabi of courses offered in the third and fourth semesters along with evaluation components III & IV (with effect from 2015-2017 batch onwards) are presented in this booklet.

COURSE PROFILE B.Sc. (Biochemistry)

Semester	Part	Category	Course Code	Course Title	Hours/Week	Credit	
						Min	Max
I	I	Language	UTAL105/ UTAL106/ UHIL101/ UFRL101	Basic Tamil I/ Advanced Tamil I/ Hindi I / French I	4	2	3
	II	English I	UENL107/ UENL108	Basic English I/ Advanced English I	5	3	4
	III	Core I	UBCM106	Fundamentals of Biochemistry	2	1	1
		Core II	UBCM105/ UBCM201	Cell Biology	6	5	5
		Core practical I	UBCR101	Cell Biology Practical	3	3	3
		Allied I	UCHA102	Chemistry	5	4	4
	Allied practical	UCHR102	Chemistry Practical	3	3	3	
	IV	Value Education			2	1	1
TOTAL					30	22	24
II	I	Language	UTAL205/ UTAL206/ UHIL201/ UFRL201	Basic Tamil II/ Advanced Tamil II/ Hindi II/ French II	4	2	3
	II	English II	UENL207/ UENL208	Basic English II/ Advanced English II	5	3	4
	III	Core III	UBCM202	Biomolecules	5	5	5
		Core practical II	UBCR201	Qualitative analysis of Biomolecules	3	2	2
		Allied II	UMBA201	Microbiology	4	4	4
	Allied II practical	UMBR201	Microbiology Practical	3	3	3	
	IV	Non Major Elective			4	2	2
		Soft skill			2	1	1
	V	Extension Activity/ Physical Education/NCC			-	1	2
	TOTAL					30	23

III	I	Language	UTAL307/ UTAL308/ UHIL301/ UFRL301	Basic Tamil III/ Advanced Tamil III/ Hindi III/ French III	4	2	3
	II	English III	UENL305/ UENL306	Basic English III/ Advanced English III	5	3	4
	III	Core IV	UBCM304	Biochemical Techniques	6	6	6
		Core practical III	UBCR301	Biochemical Techniques practical I	4	4	4
		Allied III	UMAA305	Biostatistics	5	4	4
	IV	Non Major Elective			4	2	2
Value Education				2	1	1	
TOTAL					30	22	24
IV	I	Language	UTAL405/ UTAL406/ UHIL401/ UFRL401	Basic Tamil IV/ Advanced Tamil IV/ Hindi IV/ French IV	4	2	3
	II	English IV	UENL407/ UENL408	Basic English IV/ Advanced English IV	5	3	4
	III	Core V	UBCM403/ UBCO603	Immunology	5	5	5
		Core VI	UBCM404/ UBCM303	Nutrition & Women's Health	5	5	5
		Core VII	UIDM401	Pharmaceutical chemistry	5	4	4
		Core practical IV	UBCR401	Biochemical Techniques PracticalII	4	3	3
	IV	Soft skill			2	1	1
V	Extension Activity/ Physical Education/NCC			-	-	2	
TOTAL					30	23	27
V	III	Core VIII	UBCM501	Enzymes & Intermediary metabolism	6	5	5
		Core IX	UBCM502	Human Physiology	6	5	5
		Core X	UBCM503	Basics of Bioinformatics	6	5	5
		Core practical V	UBCR501	Enzymology practical	5	3	3
		Allied optional			5	4	4
		Value education			2	1	1
TOTAL					30	23	23
VI	III	Core XI	UBCM601	Biotechnology	5	4	4
		Core XII	UBCM602	Clinical Biochemistry	5	5	5
		Core XIII	UBCM603	Molecular Biology	5	5	5
		Core XIV	UBCM604	Comprehensive Viva voce	-	1	1
		Core practical VI	UBCR601	Clinical Biochemistry practical	3	3	3
		Core practical VII	UBCR602	Hematology & Urine analysis	3	3	3
		Core XV	UBCP601/ UBCS601	Mini project/ Cancer Biology (Self Study Paper)	2	1	1
		Major Elective	UBCO604	Stem cell Biology	5	4	4

			UBCO605	Molecular Endocrinology			
			UBCO606	Pathobiology of Human Diseases and Disorders			
			UIDM601	Nano medicine			
	IV	Soft skill			2	1	1
	V	Extension Activity/ Physical Education/NCC			-	-	2
TOTAL					30	27	29
GRAND TOTAL					180	140	153

**COURSES OFFERED TO OTHER DEPARTMENTS
NON MAJOR ELECTIVE**

Semester	Part	Category	Course Code	Course Title	Contact Hour/Week	Credit	
						Min	Max
II	IV	Non Major Elective	UBCE202	Biomedical Techniques	4	2	2
			UBCE401/ UBCE203	Nutrition & Health			
			UBCE502/ UBCE204	Women's Health, Nutrition & Disorders			
III	IV	Non Major Elective	UBCE301	Hormonal Biochemistry	4	2	2
			UBCE302	Food Microbiology			
			UBCE402/ UBCE303	Clinical Nutrition			
			UBCE304	Mushroom Cultivation			

ALLIED OPTIONAL

(ELIGIBLE FOR ALL SCIENCE STUDENTS EXCEPT MAJOR)

Semester	Part	Category	Course code	Course Title	Contact Hour/Week	Credit	
						Min	Max
V	III	Allied Optional	UBCA502	Clinical Diagnostics	5	4	4
			UBCA503	Microbiology	5	4	4
			UBCA504	Reproductive Biology	5	4	4
			UBCA505	Rural Waste Management	5	4	4

EXTRA CREDIT EARNING PROVISION (Only for Interested Students)

Semester	Category	Course Code	Course Title	Min Credit	Max Credit
II	Internship	UBCI201	Summer Internship	-	1
IV	Internship	UBCI301	Summer Internship	-	1

BCM304 BIOCHEMICAL TECHNIQUES

Semester	: III	Credit	: 6
Category	: Core IV	Hours/ Week	: 6
Class & Major	: II B.Sc Biochemistry	Total Hours	: 78

Objectives:

To enable the students

- Gain knowledge on various laboratory techniques.
- Associate and apply the techniques in various biochemical analysis.

UNIT - I ELECTROCHEMICAL PARAMETERS AND MATERIALS 15 Hrs

Acid-base balance, pOH, pH, buffer, Hendersons Hasselbach equation. Principle and applications of Hydrogen electrode, Oxygen electrode, Glass electrode, Ion sensing electrode, Biosensor.

UNIT - II CENTRIFUGATION TECHNIQUES 15 Hrs

Basic principle of centrifugation techniques, Sedimentation rate, Svedberg unit/Sedimentation co-efficient. Preparative ultracentrifuge- Differential centrifugation, Density gradient, Rate zonal, Isopycnic centrifugation. Analytical ultracentrifugation - determination of molecular weight by sedimentation.

UNIT - III CHROMATOGRAPHIC TECHNIQUES 15 Hrs

General principle of chromatography- partition and adsorption. Principle, procedure and applications of Paper chromatography, Thin layer chromatography, Column chromatography, Ion exchange chromatography and Affinity chromatography.

UNIT - IV ELECTROPHORETIC TECHNIQUES 15 Hrs

Electrophoresis- Principle, Instrumentation and Applications of Paper, Agarose, Starch, SDS-PAGE, Cellulose acetate, Immuno electrophoresis, isoelectric focusing. Blotting techniques - Southern, Northern, Western.

UNIT - V PHOTOMETRY AND DETECTION METHODS 18 Hrs

Beer-Lambert's law, UV-Visible Spectrophotometry- principle, instrumentation and applications. Flame photometry- Flame emission Spectrophotometry and Atomic absorption Spectrophotometry. ELISA technique and Chemiluminescence immunoassay (CLIA) technique.

Text Books

- Upadhyay-Upadhyay Nath., *Biophysical chemistry*, 3rd revised edition, Himalaya publications, 2006.
- Keith Wilson and John Walker, *Principle and techniques of Practical biochemistry*, Cambridge press, 6th edition, 2005.

Reference Books

- Hezl & Peck, *Analytical Biochemistry*, Prentice Hall, 3rd edition 1998.
- Sadasivam S and A.Manickam, *Biochemical methods*, New Age International (P) Ltd publisher, 2008.
- Subramanian M.A, *Biophysics: Principle and techniques*, MJP publishers, 2005.

UBCR301 BIOCHEMICAL TECHNIQUES PRACTICAL - I

Semester	: III	Credit	: 04
Category	: Core Practical III	Hours/ Week	: 04
Class & Major	: II B.Sc Biochemistry	Total Hours	: 39

Objectives:

To enable the students

- Understand the principles involved in the study area.
- Attain technical competence in the specific discipline.

1. VOLUMETRIC ANALYSIS

- a) Use the potassium permanganate in the estimation of iron, oxalates, nitrite and chromates.
- b) Estimation of calcium from biological fluids(Milk and Urine)
- c) Use of potassium dichromate in the standardization of sodium thiosulphate and estimation of copper by iodometry.

2. CHROMATOGRAPHY SEPARATION

- d) Paper chromatography-separation and detection of aminoacids and simple sugars.
- e) Thin layer chromatography-separation of polar and non polar aminoacids.

Text Book

- David T Plummer, *An introduction to practical biochemistry*, 1998.

Reference Books

- Jayaraman.J, *Laboratory manual in biochemistry*, New Age International Limited publication, 1996.
- Sathasivam.S and Manickam.A 3rd edition, *Biochemical Methods*, New Age International Limited Publication, 2008.

UBCO603/UBCM403 IMMUNOLOGY

Semester	: IV	Credit	: 5
Category	: Core V	Hours/ Week	: 5
Class & Major	: II B.Sc Biochemistry	Total Hours	: 65

Objectives:

To enable the students

- Study in detail the components of immune systems & know the biochemical basis of immune disorder.
- Understand the immunological basis of immune response.
- Comprehend about the host defense against infection and over reaction of immune system.

UNIT - I INTRODUCTION **15 Hrs**

Antigen: Property specificity, Cross reactivity, antigenicity, immunogenicity, antigen determinants, haptans, adjuvants, self antigens (MHC) an outline only. Antibody: Property, classes & subclasses of Ig: structure specificity & distribution.

UNIT - II LYMPHOID ORGANS **13 Hrs**

Central & peripheral lymphoid organs- Bone marrow, thymus, bursa of fabricus, lymphnode, spleen & MALT. Cells of the lymphoreticular system.

UNIT - III IMMUNITY **13 Hrs**

Types of immunity- Innate & acquired immunity. Immune response, antigen processing & presentation.

UNIT - IV VACCINES **12 Hrs**

Immunisation practices, vaccines, Toxoids killed & Attenuated organisms, recombinant vaccine & subunit vaccines.

UNIT - V IMMUNO TECHNIQUES **12 Hrs**

Immuno electrophoresis, Immunoprecipitation, RIA, Elisa, Immunoblotting, avidin-biotin mediated immunoassay, immunohistochemistry, monoclonal antibodies & hybridoma techniques.

Text Books

- N. Arumugam, *Immunology*, Saras publication, 2007.
- Ananthanarayanan. K & Jayarama Panikar, *Text book of microbiology & Immunology*, 2005.

Reference Books

- Roitt Ivanna, Jonathan Brastoff, David Nale, *Immunology*, Blackwell publishing Lit, 1993.
- Jains Kuby, *Immunology*, W.H. Freeman and company, 4th edition, 2000.
- Peter Delves, Seamus martin, Dennis burton, Ivanna Rotti, *Essentials of immunology*, Wiley Blackwell publication, 2006.
- Richard A. Goldsby, Thomas J. Kindt, Barbara A. Osbrone. Jains Kuby, *Immunology*, W.h. freeman & company, Newyork, 5th edition, 2003.
- Geoffrey Zubay, *Immunology*, W.M.C. Brown publications, 4th edition, 1992.

UBCM303/UBCM404 NUTRITION AND WOMEN'S HEALTH

Semester	: IV	Credit	: 5
Category	: Core VI	Hours/week	: 5
Class & Major	: II B.Sc Biochemistry	Total Hours	: 65

Objectives:

To enable the students

- Impart knowledge on the importance of nutrition during life span of a women
- Enlighten on the dietary requirements during the different physiological stages

UNIT - I INTRODUCTION

10 Hrs

Nutrition – Definition, Classes of Nutrients, Status of Nutritional Health, Recommended allowances – Recommended dietary allowances for women, basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General Concepts about growth and development through different stages of life

UNIT - II PREGNANCY

15 Hrs

Stages of Gestation, maternal weight gain, complications of pregnancy, maternal physiological adjustments, Factors affecting the course and outcome of pregnancy, Effect of Malnutrition & socioeconomic factors on the nutritional status of pregnant women. Balanced Diets for Pregnant women, importance of nutrition during and prior to pregnancy, Teenage pregnancy

UNIT - III LACTATION

10 Hrs

Physiology of lactation, lactation in relation to the growth & health of infants, Nutritional requirements of nursing mothers, Effect of malnutrition on the nutritional status of nursing mothers. Hormonal control, Efficiency of milk production, importance of breast feeding, Nutritional composition of breast milk

UNIT - IV INFANT S & CHILDREN

15 Hrs

Nutrition & Feeding of Normal infants – Nutritional requirements of infants, Recommended daily dietary allowances for infants, Feeding schedule, Nutrition for preschool children - Nutritional requirements ,Balanced Diet, Nutritional status, Causes & Prevention of malnutrition

UNIT - V MENOPAUSAL

15 Hrs

Physiological changes in ageing, menopausal and post menopausal women, hormonal changes, nutritional requirement, planning a diet, Psycho-social and economical factors affecting eating behavior, social situation, knowledge & belief, institutionalization and common health problems

Text Book

- M. Swaminathan. *Essentials of Food and Nutrition*, Bangalore, Bappco publication, 2003

Reference Books

- Clark, N Sports Nutrition Guide Book, Versa Press, 1997
- Williams, MH Nutrition Aspects of Human, Physical and Athletic performance 2nd Edition, Spring Field Publication, Illinois, 1995
- Lankford, RT Marie and Steward, J Nutrition and Physical fitness, Foundation of normal and therapeutic Nutrition, Wiley Medical Publication, Newyork, 1985
- William, Sue Rodwell – Nutrition and diet therapy 5th edition, Moshey Co. St Louis, 1985
- Maurice E Shils, James A Olson, Moshe Shike, Modern Nutrition in health and disease 8th Edition Vol I, II Lea & Febiger Philadelphia, A waverly company, 1994
- Martin SR, Roberts Nutrition work with children, The University of Chicago, 1963
- Jellife D B Assessment of Nutrition status of the community, WHO, Geneva, 1966

UIDM401 PHARMACEUTICAL CHEMISTRY

Semester	: IV	Credit	: 4
Category	: Core VII	Hours/week	: 5
Class & Major	: II B.Sc Biochemistry	Total Hours	: 65

To enable the students

- Acquire knowledge about different organic molecules and their use in pharmacy.
- Understand the relationship between drug concentration and biological response.
- Analyze the functional groups responsible for the action of drugs

UNIT - I INTRODUCTON TO PHARMACEUTICAL CHEMISTRY 13 Hrs

Drugs - definition, source and nature, types of classification and nomenclature, dose response curve and LD50. Role of drugs, Drug - protein interactions, routes of drug administration.

UNIT - II DRUGS AND RECEPTORS 13 Hrs

Drug targets - Enzymes, receptors, carrier proteins. Structural proteins, nucleic acids, lipids and carbohydrates. Forces in drug - receptor interaction, receptor theories.

UNIT - III DRUG METABOLISM 13 Hrs

Drug absorption, distribution, metabolism, excretion and dosing. Pharmacokinetic oriented drug design - Drug solubility and drug stability.

UNIT - IV DRUG TESTING 13 Hrs

Biological testing and bioassays *-in-silico* using SWISS-PDB. Drug discovery. Lead compounds - natural sources and synthetic sources.

UNIT - V DRUG DEVELOPMENT 13 Hrs

Drug development, target - oriented drug design, computer aided drug design- RASMOL & HEX, Quantitative structure, activity relationship - binding interaction, functional groups and Pharmacophore - High throughput screening (HTS) and molecular docking.

Text Books

- G.Patrick, *Medicinal chemistry*, instant notes series Viva books, 2002
- F. S. K Barar, *Essentials of Pharmacotherapeutics*, S Chand & Co, Ltd. New Delhi, 2004.

Reference Books

- Satoskar R.S and Bhandar S.D, *Pharmacology and Pharmacotherapeutics*,1995
- Gary Waish, *Biopharmaceuticals: Biochemistry & biotechnology*, John wiley Sons, New York, 1998.
- F.Billmeyer, *Text book of polymer science*, New Age international, 2002.

UBCR402 BIOCHEMICAL TECHNIQUES PRACTICAL II

Semester	: IV	Credit	: 3
Category	: Core Practical IV	Hours/ Week	: 3
Class & Major	: II B.Sc Biochemistry	Total Hours	: 39

Objectives:

To enable the students

- Apply the principles of volumetric and electrophoretic techniques in biochemical analysis.
- Develop technical competence.

1. VOLUMETRIC ANALYSIS

- a) Estimation of amino acids by formal titration.
- b) Estimation of Ascorbic acid by titrimetric method using 2,6-dichlorophenol indolphenol.
- c) Determination of saponification value of edible oil.
- d) Determination of Iodine value of oil.
- e) Determination of acid number of edible oil.
- f) Estimation of reducing sugar from biological fluids by Benedict's method.
- g) Estimation of chloride by Mohr's method.

2. ELECTROPHORETIC TECHNIQUE

Separation of proteins by SDS PAGE and its staining techniques.

Text Book

- David T.Plummer, *An introduction to practical biochemistry*, 1998.

Reference Books

- J.Jayaraman, *Laboratory manual in biochemistry*, New Age International Limited Publication.
- Sadasivam.S and A.manickam, *Biochemical methods*, 3rd editon, New age International Limited publication, 2008.

UBCE301 HORMONAL BIOCHEMISTRY

Semester	: III	Credit	: 2
Category	: Non Major Elective	Hours/Week	: 4
Class & Major	: II UG	Total Hours	: 52

Objectives:

To enable the Students

- Understand the basic concepts in endocrine system.
- Seek out new knowledge and information about the diagnosis and management of endocrine and metabolic disorder.

UNIT - I INTRODUCTION **10 Hrs**

Introduction to the hormones. Hormones - definition, classification, characteristic features. Hormone receptors - features. Regulation of receptor levels. Overview mechanism of hormone action signal transduction.

UNIT - II GLYCOPROTEIN HORMONES **10 Hrs**

Secretion, biological action, functions and regulation of growth hormone, thyroid stimulating hormone, ardeno corticotrophin hormone, prolactin, gonadotropic hormone, follicle stimulating hormone, luteinizing hormone, antidiuretic hormone and oxytocin. Disorders - Dwarfism, gigantism, acromegaly, hyper and hypopituitarism, cushings disease and diabetes insipidus.

UNIT - III THYROID AND PARATHYROID HORMONES **12 Hrs**

Thyroid and parathyroid hormones: secretion, functions. Biological action of thyroid hormones. Thyroxine. Disorders: hypothyroidism - cretinism, myxoedema and hashimoto's diseases. Hyperthyroidism - Graves diseases (Exophthalmic goiter) and non-toxic goiter.

UNIT - IV PANCREATIC HORMONES **10 Hrs**

Pancreatic hormones: synthesis, regulation, biological action, mechanism of insulin. Glucagon, somatostatin and insulin growth factor and their disorders (esp diabetes mellitus, hypoglycemia).

UNIT - V ADRENAL AND GONADAL HORMONES **10 Hrs**

Adrenal and gonadal hormones: Glucocorticoids and mineralocorticoids - secretion, transport, biological effects, metabolism and excretion. Gonadal hormones- biological action of androgens and estrogens.

Text Books

- Devlin, *Textbook of Biochemistry (with clinical correlation)*, John Wiley and Sons Publishers, 1997.
- Lohar.S. Prakasa, *Endocrinology, Hormones & Human Health*, .MJP publishers, 2006.

Reference Book

- Austin and short, *Mechanism of Hormone Action*, Prema Jaypee brothers, 1992.

UBCE302 FOOD MICROBIOLOGY

Semester : III
Category : Non Major Elective
Class : II UG

Credit : 2
Hours/week : 4
Total Hours : 52

Objectives:

To enable the students

- Study the food spoilage by microorganism
- Understand the preventive measures to control food spoilage

UNIT - I INTRODUCTION **10 Hrs**

Microorganism- introduction, definition and general classification of food microbes- yeasts, mould and bacteria (*E.coli* & *C.Botulinum*) and their role in food spoilage.

UNIT - II FOOD SPOILAGE **10 Hrs**

General principles underlying spoilage of food, fitness and unfitness of food for consumption, contamination and spoilage of non perishable and perishable foods.

UNIT - III FOOD BORNE DISEASES **12 Hrs**

Food in relation to disease-food born diseases, bacterial poisoning, symptoms and prevention of staphylococcal food poisoning and salmonella food poisoning.

UNIT - IV FOOD PRESERVATION **10 Hrs**

Control and prevention of microbial food poisoning - Principles of preservation, preservation by high and low temperature, Chemical preservatives- Salt & Sugar as preservatives, new trends in preservation.

UNIT - V STERILIZATION AND PASTEURIZATION **10 Hrs**

Sterilization-Physical agents-Heat, moist heat, fractional sterilization, pasteurization. chemical agents-Phenols, alcohols, and quaternary ammonium compounds.

Text Books

- Frazier. William.C westhoff.D.C, *Food Microbiology*, TATA Mc Graw Hill, 4th Edition, 1993.
- Vijaya Ramesh.K, *Food microbiology*, MJP publishing company Ltd, 2007.

Reference Books

- Pelczar M.J., Chan J.E.C.S., Noel.Krieg.R.microbioloy - TATA Mc Graw Hill, 5th Edition, 1993.
- Prescott, Harley & Kleins, *Microbiology*, Mc.Graw-Hill International publishing company Limited, 7th Edition, 2008.

UBCE402/UBCE303 CLINICAL NUTRITION

Semester : III	Credit : 2
Category : Non Major Elective	Hours/week : 4
Class : II UG	Total Hours : 52

Objectives:

To enable the students

- Understand the importance of nutrition and apply it to reduce the nutritional disorders
- Interpret the clinical findings in the laboratory for various disease

UNIT - I HEALTH AND NUTRITION **10 Hrs**

Diet in Health- dietary requirement of Carbohydrates, Proteins, Lipids, Vitamins, Micronutrient & macronutrient. Recommended allowance for children, adolescents and adults.

UNIT - II BLOOD CELL DISORDERS **10 Hrs**

Anemia – iron deficiency anemia, microcytic & macrocytic anemia, hereditary anemia-sickle cell & Thalassemia – clinical features, diagnosis & dietary management.

UNIT - III GASTROINTESTINAL DISORDERS **10 Hrs**

Diet in disease- fever, fatty liver, peptic ulcer, constipation, gall stone, gastrointestinal disorders- clinical features, diagnosis & dietary management.

UNIT - IV SYSTEMIC DISORDERS **12 Hrs**

Clinical features, causes, diagnosis & dietary management in Diabetes Mellitus, Cardiovascular diseases and Atherosclerosis.

UNIT - V RENAL DISORDERS **10 Hrs**

Renal disorders- kidney stones, Glomerular nephritis, Chronic & acute renal failure, Causes, clinical features, Diagnosis & dietary management.

Text Books

- Swaminathan, M. *Essential of Food & Nutrition*, BAPPCO, Bangalore, 2003.
- Dr. Jyothi Singh, *Handbook of Nutrition and dietetics* Lotus Press, New Delhi, 2008.

Reference Books

- Allan Caw Robert, A. Cowan Denis St. J. Oreilly. Michael Stewart. James Sheperd. An illustrates color text, *Clinical Biochemistry, "Elseiver Health Sciences"*. 5th edition, 2013.
- PatreciaTrueman, "*Nutritional Biochemistry*". MJP publishes, 3rd edition, 2009.
- Chatterjee Rana Shindae. "*Text book of Medical Biochemistry*", Jaypee publishers 7th edition, 2008.

UBCE304 MUSHROOM CULTIVATION

Semester	: III	Credit	: 2
Category	: Non Major Elective	Hours/Week	: 4
Class & Major	: II UG	Total Hours	: 52

Objectives:

To enable the students

- Cite ideas on types and importance of mushroom.
- Express the intricacies of mushroom cultivation.
- Practice cultivation by set up of own unit.

UNIT- I INTRODUCTION TO MUSHROOMS AND ITS LIFE CYCLE **9 Hrs**

History of mushroom cultivation. Morphology, classification - edible and poisonous mushrooms. Wild and cultivated mushrooms. Life cycle of *Agaricus spp* , characteristics and importance of *Volvariella spp.*, *pleurotus spp.*, *Calocybe spp.*, and *Lentinus spp.*

UNIT- II CULTIVATION AND BIOLOGICAL IMPORTANCE **9 Hrs**

Conditions for tropical and temperate countries - isolation, spawn production, growth media, spawn running and harvesting of mushrooms. Medicinal and nutritional value of mushrooms. Composting: importance in waste recycling.

UNIT - III DISEASES AND POST HARVEST TECHNOLOGY **8 Hrs**

Diseases and pest affecting mushroom. Post harvest technology: Refrigeration – Freeze drying, drying, canning, irradiation and entrepreneurship.

UNIT - IV MUSHROOM CULTIVATION (PRACTICAL) **20 Hrs**

Bed and shed preparation, sowing seedlings, pest control, fumigation and harvesting

UNIT - V MUSHROOM RECIPIES (PRACTICAL) **6 Hrs**

Mushroom soup, Mushroom pickle, Mushroom Pulav, Mushroom Chips.

Text Books

- Nital Bahl, Hand book on Mushroom 4th edition. Vijay primlani for oxford & IBH publishing co pvt ltd, New Delhi, 2002.
- Hand book of mushroom cultivation, TNAU publications and 1999.

Reference Books

- Chang T.S and Hayes W A, 1978. *The biology and cultivation of edible mushrooms*. Academic press, New York.
- M.C.Nair, C.Gokulapalan and Lulu das, 1997. *Topics on mushroom cultivation*, Scientific publishers, Jodhpur, India

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core IV	UBCM304	Biochemical Techniques	Model preparation	Seminar
	NME	UBCE402/ UBCE303	Clinical nutrition	Assignment	Case study
		UBCE301	Hormonal Biochemistry	Assignment	Poster presentation
		UBCE302	Food Microbiology	Model preparation	Seminar
		UBCE304	Mushroom Cultivation	Assignment	Seminar
IV	Core V	UBCM403	Immunology	Poster Presentation	Seminar
	Core VI	UBCM404	Nutrition & Women's Health	Assignment	Chart Preparation
	Core VII	UIDM401	Pharmaceutical Chemistry	Assignment	Seminar

COURSE PROFILE M.Sc. (Biochemistry)

Semester	Category	Course Code	Course Title	Contact Hours/Week	Credit	
					Min	Max
I	Core I	PBCM101	Biomolecular Chemistry	5	4	4
	Core II	PBCM102	Cell Biology	5	4	4
	Core III	PBCM103	Analytical Biochemistry	5	4	4
	Core IV	PBCM104	Endocrinology	5	4	4
	Core Practical I	PBCR101	Analytical Biochemistry Practicals	5	4	4
	NME			5	4	4
TOTAL				30	24	24
II	Core V	PBCM201	Metabolism & Regulation	5	4	4
	Core VI	PBCM202	Human Physiology	5	4	4
	Core VII	PBCM203	Microbiology	5	4	4
	Core VIII	PBCM204	Molecular Biology	5	4	4
	Core Practical II	PBCR201	Microbiology and Molecular Biology Practicals	5	4	4
	Core IX	PBCX201	Mushroom cultivation (Service Learning)	-	1	1
	NME			5	4	4
TOTAL				30	25	25
III	Core X	PBCM301	Enzymology and Enzyme Technology	5	4	4
	Core XI	PBCM302	Clinical Biochemistry	5	4	4
	Core XII	PBCM303	Immunology	5	4	4
	Core XIII	PBCM304	Research Methodology in Biochemistry	5	4	4
	Core Practical III	PBCR301	Enzymology & Clinical Diagnostics	6	5	5
	Core XVI	PBCP401	Project	2	-	-
	Value Education	PSWV301	Gender Studies	2	1	1
TOTAL				30	22	22
IV	Core XIV	PBCM401	Genetics & Genetic Engineering	5	4	4
	Core XV	PIDM401	Plant Biochemistry & Pharmaceutical chemistry	5	4	4
	Core XVI	PBCP401	Project	18	10	10
	Value Education	PSWV402	Women Studies	2	1	1
TOTAL				30	19	19
GRAND TOTAL				120	90	90

**COURSES OFFERED TO OTHER DEPARTMENTS
NON MAJOR ELECTIVES**

Semester	Category	Course Code	Course Title	Contact Hours/ Week	Credit	
					Min.	Max.
I	Non Major Elective	PBCE101	Pharmaceutical Biochemistry	5	4	4
I		PBCE102	Reproductive Biology & Disorders	5	4	4
I		PBCE103	Modern Life Style Associated Diseases	5	4	4

PBCM301 ENZYMOLOGY & ENZYME TECHNOLOGY

Semester	: III	Credit	: 4
Category	: Core X	Hours/ Week	: 5
Class & Major	: II M.Sc. Biochemistry	Total Hours	: 65

Objectives

To enable the students

- Understand the properties and importance of enzymes and its action in biochemistry
- Interpret the role of enzymes in disease diagnosis and therapeutic measures.

UNIT - I KINETICS OF ENZYME ACTION 15 Hrs

Concept of ES complex, active site, specificity, derivation of Michaelis-Menten equation for uni- substrate reactions. Determination & significance of K_m & V_{max} . Importance of K_{cat}/K_m . Kinetics of zero & first order reactions. Collision & transition state theories. Classification of multi substrate reactions with examples of each class. Ping pong and random ordered mechanisms.

UNIT - II MECHANISM OF ENZYME ACTION 13 Hrs

Lock and key theory, induced fit model. Enzyme inhibition and their kinetics, determination of K_i . Acid-base catalysis, covalent catalysis, proximity, orientation effect. Strain & distortion theory. Chemical modification of active site groups. Mechanism of action of chymotrypsin, lysozyme, carboxypeptidase.

UNIT - III ENZYME REGULATION 13 Hrs

General mechanisms of enzyme regulation, product inhibition. Reversible (glutamine synthase & phosphorylase) and irreversible (proteases) covalent modifications of enzymes. Feed back inhibition and feed forward stimulation. Allosteric enzymes, qualitative description of "concerted" & "sequential" models for allosteric enzymes.

UNIT - IV ENZYME TECHNOLOGY 13 Hrs

Immobilization of enzymes, whole cell immobilization and their application, commercial production of enzymes, amylases, lipases. Enzymes modification - site directed mutagenesis.

UNIT - V APPLICATION OF ENZYMES 11 Hrs

Industrial uses of enzymes: production of glucose from starch, cellulose and dextrans, use of lactase in dairy industry, production of glucose fructose syrup from sucrose, use of proteases

in food, leather and detergent industry. Diagnostic and therapeutic enzymes. Catalytic antibodies -abzymes.

Text Books

- Trevor Palmer, Philip Bonner *Enzymes: Biochemistry, Biotechnology, Clinical Chemistry* Horwood Publishing Limited (second Edition), 2007
- Dixon and Webb *Enzymes*, Academic Press, New York, 3 rd Edition 2000

Reference Books

- E.S. West, W.R. Todd, H.S. Mason and J.T. van Bruggen, *A Text Book of Biochemistry*, Oxford and IBH Publishing Co., New Delhi, 2000
- Nicholas C. Price, Lewis Stevens, and Lewis Stevens, *Fundamentals of Enzymology: The Cell and Molecular Biology of Catalytic Proteins*, Oxford University Press, USA 2000
- David L. Nelson Michael M. Cox Lehninger *Principles of Biochemistry*, W. H. Freeman; 4th Edition edition ,2004

PBCM302 CLINICAL BIOCHEMISTRY

Semester	: III	Credit	: 4
Category	: Core XI	Hours/ week	: 5
Class & Major	: II M.Sc. Biochemistry	Total Hours	: 65

Objectives:

To enable the students

- Acquire in-depth knowledge on diseases and disorders.
- Interpret the causes to identify the diseases at early stage.
- Identify target oriented therapies.

UNIT - I GOOD CLINICAL LAB PRACTICES 13 Hrs

Importance of automation in clinical biochemistry. Good Clinical Practices: Basics and principles. Selection of Instruments, Quality assurance, maintenance of quality control programme.

UNIT - II ACID BASE BALANCES 13 Hrs

Acid base balance - coagulation of blood pH within normal range disturbances in acid base balance - acidosis, alkalosis, mixed disturbances - laboratory parameters - blood gas analysis. Fluid and electrolyte balance - regulation - disturbances of fluid and electrolyte balance - laboratory parameters in the diagnosis and management of fluid and electrolyte disorders - oral rehydration therapy.

UNIT - III METABOLIC DISORDERS 13 Hrs

Diabetes mellitus, Hypo & Hypercholesterolemia. Inborn errors of metabolism:
a) Disorders of amino acid metabolism- Tyrosinemia, phenylketonuria, alkaptonuria b) Disorders of nucleic acid metabolism- Disorders in purine/ pyrimidine metabolism. Bone marrow disorders.

UNIT - IV EVALUATION OF ORGAN FUNCTION TESTS 13 Hrs

Gastric function tests, Liver function tests and renal function tests.

UNIT - V CLINICALLY IMPORTANT HORMONES & MARKERS

13Hrs

Thyroid diseases – hormones and markers, Menstrual disorders – hormones and markers, Tumor markers.

Text Books

- C.A.Burtis & Ashwood Teitz, *Fundamentals of Clinical Chemistry*, W. B. Saunders company, 2005
- David Plummer, *Practical Biochemistry*, Tata McGraw- Hill, 2000.

Reference Books

- Thomas Devlin, Text book of *Biochemistry with clinical correlation*, John Wiley and Sons, 2000.
- William J. Marshall & Stephen K. Angert, *Clinical Biochemistry – Metabolic concepts and Clinical aspects*, Churchill Livingstone, 2002.
- P.D.Mayne, A.Hodder, *Clinical chemistry in diagnosis and treatment*, Arnold publication, 6 Rev Ed, 1994.

PBCM303 IMMUNOLOGY

Semester : III
Category : Core XII
Class & Major : II M.Sc. Biochemistry

Credit : 4
Hours/ week : 5
Total Hours : 65

Objectives:

To enable the students

- Understand the structure, functions and integration of immune system.
- Explain the antigen-antibody interactions.
- Illustrate the engineered antibodies used for treating most of the human diseases.

UNIT - I INTRODUCTION

13 Hrs

Introduction: Terminologies –History of Immunology –Immunoematology, Blood groups, Blood transfusion –Rh –incompatibilities –immunity –types of immunity –innate and acquired. Immune systems: Anatomy of lympho-recticular system –Primary lymphoid organ. Secondary lymphoid tissue –cells of the immune system –detailed aspects of T and B cells – receptors –activation and function.

UNIT - II ANTIGEN –ANTIBODY REACTIONS

13 Hrs

Antigens: Types, properties, haptens – adjuvants –vaccines –types –toxoids antitoxins, Immunoglobulins – structure types and properties. Theories of antibody production. Antigen – antibody reactions – in vitro methods; Agglutination –Precipitation, Complement fixation, Immuno fluorescence, ELISA, RIA, in vivo methods.

UNIT - III PREPARATION AND PURIFICATION OF ANTIGENS

13 Hrs

Preparation and purification of Antigens. Extraction of antigens from biological materials, Fractionation and purification. Preparation of synthetic antigens. Recombinant antigens. Production, Purification and transplantation of antibodies; Immunization schedule.

UNIT - IV HYBRIDOMA TECHNOLOGY **13 Hrs**

Basic principles of Hybridoma technology. Monoclonal antibody (MoAb) production and application. Purification and characterization of MoAbs. Characterization of MoAbs. Labeling of Antibodies.

UNIT - V HYPERSENSITIVITY REACTIONS **13 Hrs**

Hypersensitivity reactions - antibody mediated, Type I anaphylaxis, Type II - Antibody dependent cell cytotoxicity, Type III - immune complex reactions - respective diseases and immunologic methods of diagnosis - cell mediated immune responses - Lymphokines, Cytokines. Type IV - Hypersensitivity reactions, MHC and transplantation.

Text Books

- Abul Abbas, Andrew Lichtman, and Jordan Pober *Cellular and molecular immunology*, W. B. Saunders, fourth edition, 2000.
- Ivan Roitt, Jonathan Brostoff, and David Male *Immunology* Mosby, London. 6th edition, 2001.

Reference Books

- Abul K. Abbas. Andrew H. Lichtman and Jordan S. Pober, *Cellular and Molecular Immunology* (2nd edition). W.B. Saunders company, Philadelphia, 1994.
- Charles Janeway, Jr. and Paul Travers, *Immunobiology - the immune system in health and disease*, Garland Publishing, Inc. Fifth edition, 2001.

PBCM304 RESEARCH METHODOLOGY IN BIOCHEMISTRY

Semester	: III	Credit	: 4
Category	: Core XIII	Hours/ week	: 5
Class & Major	: II M.Sc. Biochemistry	Total Hours	: 65

Objectives:

To enable the students

- Understand about basic tools and techniques involved in research.
- Introduce the concept of statistical tools for data analysis in scientific research.

UNIT - I FUNDAMENTALS OF RESEARCH **13 Hrs**

Research-Meaning, Objectives & Motivation. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method –Understanding the language of research - Concept, Construct, Definition, Variable. Research Process. Problem Identification & Formulation - Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good Hypothesis - Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance.

UNIT - II RESEARCH AND EXPERIMENTAL DESIGN **13 Hrs**

Research Design: Concept and Importance of Research - Features of a good research. Types and concepts of research design - Exploratory, Descriptive, Qualitative and Quantitative.

UNIT - III MEASUREMENT SAMPLING AND DATA ANALYSIS **13 Hrs**

Measurement: Concept & Problems in research - Validity and Reliability. Levels of measurement (Nominal, Ordinal, Interval, Ratio). Sampling - Types and statistics of Simple, Random, Systematic, Stratified Random & Multi-stage. Data Analysis: Data Preparation -

Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis - Cross tabulations and Chi-square test including testing hypothesis of association.

UNIT - IV TOOLS / TECHNIQUES FOR RESEARCH 13 Hrs

Databases for Biological Science Discipline.FASTA, BLAST ,EMBL net ,DDBJ and NCBI. Protein sequence databases; primary databases SWISS - PROT, TrEMBL, NRL-3D. Secondary Databases; PRO SITE, PROFILES, PRINTS, Pfam, BLOCKS and IDENTITY. Composite protein databases.

UNIT - V THESIS WRITING AND PAPER PUBLICATION 13 Hrs

Thesis writing-Introduction, Review of literature, materials and methods, Interpretation of results, Summary and Conclusion, Bibliography, Acknowledgement. Interpretation of Data and Paper Writing - Layout of a Research Paper, Journals in biological science, Impact factor of Journals, Ethical issues related to publishing, Plagiarism and Self-Plagiarism.

Text Books

- Panneerselvam, *Research Methodology*, R.Prentice hall of India, New Delhi, 2004.
- Kothari CR, *Research Methodology –Methods and techniques*, New Wiley Eastern Ltd., Delhi, 2009.

Reference Books

- Donald Cooper & Pamela Schindler, *Business Research Methods*, TMGH, 9th edition, 2013.
- Alan Bryman & Emma Bell, *Business Research Methods*, Oxford University Press, 2015.
- P.Saravanavel, *Research Methodology*, JBA publishers, 2003.

PBCR301 ENZYMOLOGY & CLINICAL DIAGNOSTICS

Semester	: III	Credit	: 5
Category	: Core Practical III	Hours/ Week	: 6
Class & Major	: II M.Sc. Biochemistry	Total Hours	: 78

Objectives:

To enable the students

- Acquire knowledge on various biochemical tests involved in clinical diagnosis.
- Examine marker enzymes during pathological conditions.

ENZYMOLOGY

1. Amylase (Km, optimum pH, optimum temperature)
2. Urease (Km)
3. Lipase (Km)
4. Transaminase (Km)
5. Assay of Alkaline and acid phosphatases in serum samples

CLINICAL DIAGNOSTICS

1. Estimation of (from blood/plasma/serum/urine)
2. Glucose by GOD-POD Method
3. Protein estimation by Biuret method

4. Triglycerides GPO/POD by kit method
5. Cholesterol by Zak and Zaltsky Method
6. HDL estimation
7. Calcium (Ca) by OCPC Method
8. Iron (Fe) by Dipyrindyl Method
9. Copper (Cu) by Dithiocarbonate Method
10. Phosphorus (P) by Fiske- Subbaraow Method
11. ELISA

PBCM401 GENETICS AND GENETIC ENGINEERING

Semester	: IV	Credit	: 4
Category	: Core XIII	Hours/ week	: 5
Class & Major	: II M.Sc. Biochemistry	Total Hours	: 65

Objectives:

To enable the students

- Explain various tools and techniques involved in genetic engineering.
- Estimate the expression of genes in various hosts.
- Evaluate the response of recombinant genes.

UNIT - I INTRODUCTION TO GENETICS 13 Hrs

Cells & Chromosomes - Basic cell types – structure & evolutionary relationships, Overview of Prokaryotic & Eukaryotic cells, Cellular environment, Cell cycle – Phases, regulations and check points.

UNIT - II BASIC PRINCIPLES OF HEREDITY 13 Hrs

Mendelian principles of inheritance – Dominance, codominance, incomplete dominance, segregation, interaction of genes, linkage (chromosomal & sex). Patterns of Inheritance – Autosomal inheritance, Sex-linked inheritance, Cytoplasmic inheritance.

UNIT - III VECTORS AND GENE CLONING 13 Hrs

Enzyme uses in genetic engineering – Restriction endonucleases, restriction digestion, mapping, ligation, Cloning vectors -- Desirable properties of vectors – Prokaryotic & Eukaryotic Expression Systems (Constitutive & Inducible). Plasmid Vectors - Phage Vectors - Cosmids -- Phagemids - BACs - Yeast Vectors - YACs - Lentiviral Vectors -- Adenoviral Vectors – Plant Vectors - Insect Vectors.

UNIT - IV GENE RECOMBINATION AND GENE TRANSFER 13 Hrs

Methods of gene recombination - Bacterial Conjugation, Transformation, Transduction. Gene transfer methods - Microinjection, Electroporation, Microprojectile, Shot Gun method, Ultrasonication, Liposome fusion. Competence, identification of transformed colonies/clones – Blue white screening, DNA sequencing.

UNIT - V APPLICATIONS OF GENETIC ENGINEERING 13 Hrs

Genetic engineering in animals - Production of transgenic mice, Therapeutic products produced by genetic engineering- plasma proteins, human hormones, immune modulators and vaccines. Genetic engineering in plants: Use of *Agrobacterium tumefaciens* and *A.rhizogenes*, Ti

plasmids, Strategies for gene transfer to plant cells – Herbicide resistant, Drought tolerant, pest resistant, salt tolerant transgenic plants.

Text Books

- Edwin H. McConkey, Human Genetics: The Molecular *Revolution*, Jones & Bartlett, Boston & London. 1993.
- A.P. & E.J. Mange '*Basic Human Genetics*'. Sinauer, London. 1993.

Reference Books

- Sandy B. Primrose, Richard Twyman, *Principles of Gene Manipulation and Genomics*, 7th Edition, Blackwell Publishing
- T. A. Brown, *Gene Cloning and DNA Analysis: An Introduction*, John Wiley & Sons, 6th Edition
- Desmond S. T. Nicholl, *An Introduction to Genetic Engineering*, 3rd Edition, Cambridge University Press

PDIM401 PLANT BIOCHEMISTRY & PHARMACEUTICAL CHEMISTRY

Semester : IV
Category : Core XIV
Class & Major : II M.Sc. Biochemistry

Credit : 4
Hours/ week : 5
Total Hours : 65

Objectives:

To enable the students

- Identify the biochemical pathways in plants.
- Analyze the medicinal and industrial value of plants.
- Explain the tissue culture in the discovery of new drugs.

UNIT- I PLANT CELL AND PHOTOSYNTHESIS

13 Hrs

Structure of plant cell (1). Structure of plant cell membrane and cell wall. Photosynthesis: Structure & function of chloroplast system. Photosynthetic pigments and their functions, Photo system I & II. Photosynthetic electron transport and photophosphorylation. Calvin cycle(C3 plants), Hatch slack pathway (C4 plants), Crassulacean acid metabolism.

UNIT - II PLANT RESPIRATION AND METABOLISM

13 Hrs

Plant respiration: Cyanide sensitive and insensitive respiration. Nitrogen metabolism: Development and structure of root nodules, Role of nod factors in nodule development. Structure of plant nitrogenase system, Symbiotic nitrogen fixation and its regulation. Formation and assimilation of ammonia. Sulphur metabolism Sulphate activation, Reduction of active sulphate, Oxidation of inorganic sulphur, incorporation of sulphur into amino acids.

UNIT- III PLANT TISSUE CULTURE AND HORMONES

13 Hrs

Plant tissue culture: Plant cell organs and embryo culture, anther culture, somaclonal variation, protoplast isolation, fusion and culture of protoplasts, Application of plant tissue culture. Plant hormones: Biosynthesis, structure and biochemical mode of action of auxins, gibberellins, cytokinins, abscisic acid and ethylene. Other plant growth regulators. Biochemistry of seed development, dormancy, biochemical changes during germination of seeds. Biochemistry

of fruit development and ripening. Structure and function of phytochrome, hormonal regulation of flowering, photoperiodism, and vernalization

UNIT - IV PLANT METABOLITES AS THERAPEUTIC AGENTS **13 Hrs**

Alkaloids, flavanoids, polyphenols, tannins, terpenoids, Quinones – Sources, properties, mechanism of action.

UNIT - V DRUG DISCOVERY AND DESIGN **13 Hrs**

Tools of bioinformatics in Drug discovery and drug designing. Docking, Use of Schrodinger and discovery studio for drug designing.

Text Books

- Taiz & Ziger, *Plant physiology*, Sinauer associates, 5th edition, 2012.
- Donald J. Abraham, *Burger's Medicinal Chemistry*, John Wiley & Sons N.Y., 6th edition, 2010

Reference Books

- William Hopkins & Norman P. A. Huner, *Introduction of Plant Physiology*, Wiley 4th edition, 2008.
- Buchanan, *Biochemistry and molecular Biology of plant*, Wiley 2nd edition, 2015.
- Wilson and Gisvold, *Text book of organic medicinal and pharmaceutical chemistry*, J.B. Lippincott cam, 12th edition, 2010.

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core IX	PBCM301	Enzymology & Enzyme Technology	Poster presentation	Seminar
	Core X	PBCM302	Clinical Biochemistry	Case study	Seminar
	Core XI	PBCM303	Immunology	Poster presentation	Seminar
	Core XII	PBCM304	Research Methodology	assignment	Seminar
VI	Core XIII	PBCM401	Genetics And Genetic Engineering	assignment	Seminar
	CoreXIV	PDIM401	Plant Biochemistry & Pharmaceutical Chemistry	assignment	Seminar

DEPARTMENT OF CHEMISTRY

Preamble

UG: Course profile, list of courses offered to other departments and the syllabi of courses offered in the first two semesters along with evaluation components III and IV (with effect from 2015-2018 batch onwards) and

PG: Course profile, list of courses offered to other departments and the syllabi of courses along with evaluation components III and IV (with effect from 2015-2017 batch onwards) are presented in this booklet.

COURSE PROFILE B.Sc (Chemistry)

Semester	Part	Category	Course Code	Course Title	Contact Hrs/Week	Credits	
						Min	Max
I	I	Tamil/ Hindi/ French	UTAL105/ UTAL106/ UHIL101/ UFRL101	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I/ French-I	4	2	3
	II	English	UENL107/ UENL108	Basic English-I/ Advanced English-I	5	3	4
	III	Core I	UCHM104	Fundamentals of Chemistry	2	1	1
		Core II	UCHM105	General Chemistry –I	4	4	4
		Core III	UCHM106	Analytical Chemistry	4	4	4
		Core Practical I	UCHR204	Semimicro Qualitative Inorganic Analysis	3	-	-
		Allied I	UPHA101	Allied Physics - I	3	3	3
	Allied Practical I	UPHR102	Allied Physics Practical-I	3	2	2	
IV	Value Education			2	1	1	
Total					30	20	22
II	I	Tamil/ Hindi/ French	UTAL205/ UTAL206/ UHIL201/ UFRL201	Basic Tamil-II/ Advanced Tamil-II/ Hindi-II/ French-II	4	2	3
	II	English	UENL207/ UENL208	Basic English-II/ Advanced English-II	5	3	4
	III	Core IV	UCHM202	General Chemistry –II	6	6	6
		Core Practical I	UCHR204	Semimicro Qualitative Inorganic Analysis	3	4	4
		Allied II	UPHA201	Allied Physics II	3	3	3
		Allied Practical I	UPHR202	Allied Physics Practical-II	3	2	2
	IV	NME			4	2	2
		Soft skill			2	1	1
V	Extension Programme/ Physical Education/NCC			-	1	2	
Total					30	24	27
III	I	Tamil/ Hindi/ French	UTAL305/ UTAL306/ UHIL301/ UFRL301	Basic Tamil-III/ Advanced Tamil-III/ Hindi-III/ French-III	4	2	3

	II	English	UENL307/ UENL308	Basic English-III/ Advanced English-III	5	3	4
	III	Core V	UCHM303	General Chemistry –III	4	4	4
		Core Practical II	UCHR404	Volumetric Analysis	3	-	-
		Core VI	UCHM304	Separation & Purification Techniques	3	3	3
		Allied	UMAA306	Algebra, Differential Calculus and Trigonometry	5	5	5
IV	NME			4	2	2	
	Value Education			2	1	1	
Total					30	20	22
IV	I	Tamil/ Hindi/ French	UTAL405/ UTAL406/ UHIL401/ UFRL401	Basic Tamil-IV/Advanced Tamil- IV/ Hindi-IV/ French-IV	4	2	3
	II	English	UENL407/ UENL408	Basic English/ Advanced English	5	3	4
	III	Core VII	UCHM403	General Chemistry –IV	6	5	5
		Core Practical II	UCHR404	Volumetric Analysis	3	4	4
		Core VIII	UCHM404	Instrumental Methods of Analysis	5	5	5
		Allied	UMAA406	Integral Calculus, Laplace Transform & Ordinary Differential Equation	5	5	5
	IV	Soft skill	USKS401		2		
V	Extension Programme/ Physical Education/NCC			-	-	2	
Total					30	24	28
V	III	Core IX	UCHM504	Inorganic Chemistry – I	5	4	4
		Core X	UCHM505	Organic Chemistry –I	6	5	5
		Core XI	UCHM506	Physical Chemistry –I	5	4	4
		Core Practical III	UCHR606	Inorganic & Organic Chemistry Practical	4	-	-
		Core Practical IV	UCHR605	Physical Chemistry Practical	3	-	-
	Allied Optional			5	4	4	
IV	Value education			2	1	1	
Total					30	18	18
VI	III	Core XII	UCHM607	Inorganic Chemistry II	4	4	4
		Core XIII	UCHM608	Organic Chemistry II	4	4	4
		Core XIV	UCHM609	Physical Chemistry II	4	4	4
		Core XV	UIDM601	Solid State Chemistry	4	4	4
		Major elective	UCHO602/ UCHO603	Polymer Chemistry / Medicinal Chemistry	5	4	4
		Core Practical III	UCHR606	Inorganic & organic chemistry practical	4	8	8
		Core Practical IV	UCHR605	Physical Chemistry Practical	3	4	4
	Viva –Voce	UCHM605	Comprehensive Viva-Voce	-	1	1	
	IV	Soft Skill	USKS601		2	1	1
V	Extension Programme/ Physical Education			-	-	2	
Total					30	34	36
Grand Total					180	140	153

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course code	Course title	Contact Hrs / week	Credits	
					Min	Max
II	Core	UCHI201	Internship	-	-	1
IV	Core	UCHI401	Internship	-	-	1
V	Core	UCHM507	Geo Chemistry(Self Study Paper)	-	-	1
	Core	UCHP501	Mini Project	-	-	1

LIST OF COURSES OFFERED TO OTHER DEPARTMENTS ALLIED AND ALLIED OPTIONAL COURSES

Semester	Part	Category	Course code	Course title	Contact Hrs / week	Credits	
						Min	Max
I	III	Allied- I	UCHA102	Chemistry – I	5	4	4
IV	III	Allied- I	UCHA402	Chemistry – II	3	3	3
I	III	Allied Practical-I	UCHR103	Volumetric & Organic Analysis	3	2	2
IV	III	Allied Practical-II	UCHR403	Volumetric & Organic Analysis	3	2	2
V	III	Allied Optional	UCHA502 UCHA504	Industrial Chemistry Dairy Chemistry	5	4	4

NON MAJOR ELECTIVE COURSES

Semester	Part	Category	Course code	Course title	Contact hrs / week	Credits	
						Min	Max
II	IV	Non Major Elective	UCHE204	Food Chemistry	4	2	2
III	IV	Non Major Elective	UCHE302	Cosmetics and Detergents	4	2	2
					4	2	2

UCHM303 GENERAL CHEMISTRY-III

Semester	: III	Credit	: 4
Category	: Core V	Hours/ week	: 4
Class & Major	: II B.Sc Chemistry	Total Hours	: 52

Objectives:

To enable the students

- Understand the characteristics of Boron and carbon family.
- Write the mechanism of dienes and aromatic compounds.
- Apply the principles of thermodynamics in chemical reactions.

UNIT-I CHEMISTRY OF P-BLOCK ELEMENTS

12 Hrs

Boron family: Group discussion, anomalous behavior of boron, electron deficiency & electron acceptor behavior of borontrihalides. Bonding in diborane. Preparation, properties, uses & structure of Borazole, boron nitride.

Carbon family: Group discussion, comparison of properties of C, Si - valency, oxides, halides, hydrides & oxyacids. Classification, preparation, properties & uses of carbides. Classification of silicates. Chemistry of silicones. Allotropes of carbon- Graphite, Fullerenes.

UNIT-II DIENES AND POLYMERIZATIONS

8 Hrs

Dienes : Types of dienes, stability & chemical reactivity. 1,2 & 1,4 addition with mechanism. Free radical addition, polymerization of dienes. Diels alder reaction. Synthesis of dienes-1:3 butadiene, isoprene & chloroprene.

Polymerisation: Types of polymerization- free radical, cationic & anionic polymerization including mechanism. Preparation of polymers- addition polymers & condensation polymers with example

UNIT - III AROMATICITY AND POLYNUCLEAR HYDROCARBONS

12 Hrs

Aromaticity: Modern theory of aromaticity- Huckel's rule $[4n+2]$ & its simple applications. Aromatic hydrocarbons- Resonance in benzene, delocalized cloud in benzene.

Electrophilic substitution reactions in aromatic compounds: General mechanism- nitration, halogenation, sulphonation, Friedal Craft's acylation & alkylation. Directive influence- orientation- o/p ratio- nuclear side chain halogenation.

Polynuclear hydrocarbons: Isolation, synthesis, properties and uses of naphthalene, anthracene and phenanthrene. Structural elucidation of naphthalene.

UNIT - IV FIRST LAW OF THERMODYNAMICS

10 Hrs

First law of thermodynamics: C_p , C_v relationship. Calculation of W, Q, ΔE & ΔH for the expansion of ideal gases under reversible, isothermal and adiabatic conditions.

Thermo Chemistry: Bond energy, bond dissociation energy. Calculation from thermo chemical data, variation of heat of a reaction with temperature- Kirchoff's Equation

UNIT-V SECOND LAW OF THERMODYNAMICS

10 Hrs

Carnot's cycle: Carnot's theorem, Kelvin scale of temperature.

Second law of Thermodynamics: Need for the II law, different forms of statement of II law, spontaneous process- criteria of spontaneity. Cyclic process. Heat engines. Significance of Entropy

Gibb's free energy: Helmholtz free energy- their variation with temperature, pressure and volume. Criteria for spontaneity. Maxwell's equations and thermodynamic equation of state - Gibbs Helmholtz equation- derivation and applications.

Text Books

- Bahl. S and Arun Bahl, "*Advanced Organic Chemistry*", Revised Edition, S. Chand and Company Ltd, Ram Nagar, New Delhi, 2010.

- Madan .R.D, “*Modern Inorganic Chemistry*”, 3rd Edition, S.Chand & Company Limited, New Delhi, 2011.
- Puri.B.R, Sharma.L.R & Pathania.M.S, “*Principles of Physical Chemistry*”, Millennium Edition, Vishal publishing & Co, Jalandhar, 2004.

Reference Books

- Finar.I.L, “*Organic Chemistry Volume I and II*”, 6th Edition, England Addison Wesley Longman Ltd, New Delhi 2006.
- Puri.B.R, Sharma.L.R and Kallia K.C, “*Inorganic Chemistry*”, Milstone Publisher, New Delhi, 2003.
- Soni.P.L, “*Text book of physical chemistry*”, 22nd Revised Edition, Sultan Chand, New Delhi, 2001.

UCHR404 VOLUMETRIC ANALYSIS

Semester	: III & IV	Credit	: 4
Category	: Core practical II	Hours/Week	: 3+3
Class & Major	: II B.Sc Chemistry	Total hours	: 78

Objectives:

To enable the students

- Estimate the presence of chemical substances using Volumetric analysis.

Acidimetry

1. Estimation of sodium hydroxide – standard sodium carbonate.
2. Estimation of borax – std. sodium carbonate.
3. Estimation of bicarbonate and carbonate in a mixture.

Permanganometry

1. Estimation of oxalic acid – standard – Mohr’s salt or ferrous sulphate.
2. Estimation of ferric ion.

Iodimetry

1. Estimation of iodine Vs ascorbic acid.

Iodometry

1. Estimation of copper.

Complexometry

1. Estimation of zinc or magnesium using EDTA.
2. Estimation of Zinc using potassium ferrocyanide.
3. Estimation of Total hardness of water.

Dichrometry

1. Estimation of ferrous ion using diphenylamine I N or Phenyl anthranlic acid as indicator.

Self-designing experiments:

1. Estimation of acids from various tablets
2. Estimation of calcium and Magnesium in water from different areas.
3. Estimation of carbonic acid from soft drinks

Reference Books

- Vogel's, "Text book of Quantitative Chemical Analysis", 6th Edition, Pearson Education Ltd, New Delhi, 2008.
- Thomas A.O, "Practical chemistry", 2nd Edition, Scientific Book Center, Cannanore, 2004.
- Venkateswaran.V, Veerasawamy.R & Kulandaivelu.A.R, "Basic Principles of practical Chemistry", 2nd Edition, S. Chand & Sons Publications, New Delhi, 2004.

UCHM304 SEPARATION AND PURIFICATION TECHNIQUES

Semester	: III	Credit	: 3
Category	: Core VI	Hours/Week	: 3
Class & Major	: II B.Sc. Chemistry	Total Hours	: 39

Objectives:

To enable the Students

- Understand principles of Separation and Purification techniques.
- Use the Separation and Purification techniques through lab demonstration.

UNIT-I SEPARATION OF LIQUIDS 6 Hrs

Distillation-Principles and techniques of distillation, fractional distillation, distillation under reduced pressure, steam distillation and azeotropic distillation.

UNIT-II SEPARATION OF SOLIDS 6 Hrs

Recrystallisation, sublimation. Extraction-solvent extraction, continuous Extraction, soxhelt extraction. Chemical methods of purification and test of purity.

UNIT-III COLUMN CHROMATOGRAPHY 9 Hrs

Chromatography: Introduction-classification-partition, adsorption, Mobile phase - Stationary phase- types of adsorbent-eluent. **Column Chromatography:** - Principle, techniques and applications.

UNIT-IV PAPER, THIN LAYER AND ION EXCHANGE CHROMATOGRAPHY 9 Hrs

Paper chromatography-Principle, techniques and applications.

Thin layer chromatography: Principle, techniques and applications. Superiority of TLC over PC.

Ion exchange Chromatography- Principle, cationic resin, Anionic resin techniques and applications.

UNIT-V ADVANCED TECHNIQUES IN CHROMATOGRAPHY 9 Hrs

Gas Chromatography- Principle, techniques and applications.

High Performance Liquid Chromatography- Principle, techniques and applications

Text Books

- Gopalan .R, Subramanian P.S, Rangarajan. K, "Elements of Analytical Chemistry", Sultan Chand and Sons, 2009.
- Srivastava .V.K., Srivastava .K.K, "Introduction to Chromatography: Theory and Practice", S. Chand and company, New Delhi, 2006.

Reference Books

- Sharma B.K., "Instrumental methods of Analysis", Geol Publications, 2008.
- Skoog .D.A., West.D.M and Holler .F.J., "Analytical Chemistry: An Introduction", 7th edition, Saunders college publishing, Philadelphia, 2010.
- Kaur H, "Instrumental methods of Chemical Analysis", Pragathi Prakasan Publications, Meerut, 2006.

UCHM403 GENERAL CHEMISTRY-IV

Semester	: IV	Credit	: 5
Category	: Core VII	Hours/Week	: 6
Class & Major	: II B.Sc Chemistry	Total Hours	: 78

Objectives:

To enable the Students

- Understand the properties of Nitrogen, Oxygen, Halogen & Noble gas family.
- Apply the concepts of Second and Third Law of Thermodynamics.
- Find the mechanism of various organic chemical reactions.

UNIT - I CHEMISTRY OF NITROGEN AND OXYGEN FAMILY 16 Hrs

Nitrogen Family: Comparative study of N,P,As,Sb & Bi - oxides, halides, hydrides & oxyacids. Valency states. Structure of oxides, oxyacids. Structure & uses of hydrazine, hydroxylamine & hydrazoic acids.

Oxygen family: Comparative study of O,S,Se&Te. Hydrides, oxides, halides & oxyacids of sulphur including peroxyacids & thionic acids. Structure of oxides.

UNIT - II CHEMISTRY OF HALOGEN AND NOBLE GASES 16 Hrs

Halogens: Comparative study of F,Cl,Br,I & At. Reactivities, hydracids, oxides & oxyacids. Interhalogen compounds, pseudohalogens & positive iodine. Fluorides of oxygen. Exceptional properties of fluorine.

Noble gases: Electronic configuration - reason for placing in zero group - position in the periodic table - Applications- Clathrates - compounds of xenon - hybridization and geometries of XeF₂, XeF₄, XeF₆ & XeOF₄.

UNIT – III CHEMISTRY OF ALKYL/ARYL HALIDES 16 Hrs

General methods of preparation and properties of alkyl halide-Nucleophilic substitution reactions- SN₁, SN₂ and its mechanism, Elimination reaction - E₁,E₂ and its mechanism.General methods of preparation of aryl halide. Chemical properties- reaction of halogen atom-mechanism of nucleophilic aromatic substitution- unimolecular, bimolecular and elimination- addition mechanism(benzyne mechanism), reduction, fittig reaction, Ullmann synthesis. Reactions of benzene nucleus, low reactivity of aryl halides. Chemical properties of aralkyl halide- reactions of the halogen atom, nuclear substitution in benzene, reactions of the side chain.

UNIT – IV STEREOCHEMISTRY 15 Hrs

Optical Isomerism: racemisation-methods of racemisation (by substitution and tautomerism) - resolution- methods of resolution(mechanical Seeding, biochemical and conversion to diastereoisomerism)- Walden inversion.

Projection Formulae: Fischer, flying wedge, sawhorse and Newmann projection formulae-notation of optical isomerism-Cahn-Ingold-Prelog rules-R-S-notations for optical isomers with one and two asymmetric carbon atom-erythro and threo representations.Optical Activity in Compounds not containing asymmetric carbon atoms-biphenyl-allenes and spiranes.

UNIT-V CHEMICAL EQUILIBRIUM AND THIRD LAW OF THERMODYNAMICS 15 Hrs

Thermodynamic derivation of the law of chemical equilibrium - reaction isotherm-standard free energy change and equilibrium constant - variation of equilibrium constant with temperature - Van't Hoff Isochore.

Law of Mass Action: Various forms of equilibrium constants. Relationship between K_p and K_c .

Distribution law: Thermodynamic derivation - limitation of the law and applications

Third Law of Thermodynamics: Entropy of absolute zero - Planck's formulation of third law - unattainability of absolute zero - Thermodynamic properties at absolute zero-Nernst Heat theorem -statement of III law of thermodynamics-evaluation of entropy from heat capacity measurements - exceptions to III law.

Text Books

- Puri Sharma Pathania- "*Principles of Physical Chemistry*"- Shoban Lal Nagin Chand & Co.,Jalandhar.(2006).
- Madan.R.D, - "*Modern Inorganic Chemistry*" - S.Chand & Company Limited.(2006).
- Bahl and Arun Bahl - "*Advanced Organic Chemistry*" - S. Chand(2008).

Reference Books

- Huheey.J.E, Harper and Collins - "*Inorganic chemistry*" - NY IV edition (2007).
- Morrison.R.T. and Boyd - "*Organic Chemistry*" - VI Edition - prentice Hall of India, New Delhi(2006).
- Kundu and Jain - "*Physical Chemistry*" - S. Chand. (2010).

UCHM404 INSTRUMENTAL METHODS OF ANALYSIS

Semester	: IV	Credit	: 5
Category	: Core VIII	Hours/Week	: 5
Class &Major	: II B.Sc Chemistry	Total Hours	: 65

Objectives:

To enable the students

- Acquire the fundamentals and principles of spectroscopic techniques.
- Enhance the knowledge in thermo and electro analytical methods.

UNIT - I FUNDAMENTAL OF SPECTROSCOPY 10 Hrs

Electromagnetic spectrum: Electromagnetic radiation- properties, wave parameters - interaction of light with matter-types of spectroscopy: Atomic & Molecular spectroscopy-Absorption and Emission spectra.

UNIT - II PRINCIPLES OF SPECTROSCOPIC TECHNIQUES 15 Hrs

UV- Visible spectroscopy - instrumentation - photocolormeter and spectrophotometer - block diagrams with description of component .

Infrared spectroscopy - instrumentation - block diagram - source - monochromator – cell-sampling techniques - detector and recorders.

UNIT - III ABSORPTION AND EMISSION SPECTROSCOPIC TECHNIQUES **13 Hrs**

Flame Spectroscopy, Atomic Absorption Spectroscopy (AAS): Principle, theory, instrumentation and application. Luminescence Spectroscopy, Fluorescence Spectroscopy: Principle, theory, instrumentation and application.

UNIT - IV ELECTRO ANALYTICAL METHODS **16 Hrs**

Polarography - principle - concentration polarization- dropping mercury electrode- advantage and disadvantage of DME- convection, migration and diffusion currents - illkovic equation(derivation not needed) and its significance - experimental assembly - electrodes - capillary solution- current voltage curve - oxygen wave- influence of temperature and agitation on diffusion layer - polarography as an analytical tool in quantitative and qualitative analysis. Amperometry - principle and uses.

UNIT - V THERMO ANALYTICAL METHODS **11 Hrs**

Principles involved in thermo gravimetric analysis and differential gravimetric analysis - discussion of various components with a block diagram – characteristics of TGA and DTA - factors affecting TGA and DTA curves - thermometric titrations.(Mandatory for virtual Instrumentation lab visit)

Text Books

- Gopalan .R, “*Elements of analytical chemistry*”, Sultan Chand, 2009.
- Skog.A and West .M, “*Fundamentals of analytical chemistry*”, Saunders College Publications, 2004.

Reference Books

- KhopkarS.M, “*Analytical Chemistry*”, New Age International, 2006.
- SharmaB.K, “*Instrumental methods of chemical analysis*” God Publications, 2007.
- Usharani. S, “*Analytical Chemistry*”, Macmillan, 2008.

UCHA402 CHEMISTRY – II

Semester	: IV	Credit	: 3
Category	: Allied	Hours Week	: 3
Class &Major	: II B.Sc Physics	Total Hours	: 39

Objectives:

To enable the Students

- Understand the fundamentals atomic structure and nuclear chemistry.
- Analyse the conductance of solutions and electromotive forces using electro analytical techniques.
- Differentiate the types and properties of solids.

UNIT-I ATOMIC STRUCTURE **7 Hrs**

Different of model atomic structure: Dalton, Thomson’s model and Rutherford, Quantum numbers - n, l, m, s. Pauli exclusion Principle. Energy level diagram, Hunds rule of maximum

multiplicity, Stability of half filled & completely filled orbitals. Shapes of s,p,d,f block elements. Electronic configuration of few elements.

UNIT -II NUCLEAR CHEMISTRY

7 Hrs

Fundamentals particles of the nucleus - nucleon terminology , nuclides, isotopes, isobars ,isotones, mirror nuclei-induced radio activity of radio isotopes - nuclear energy - fission - fusion - Nuclear reactors- accelerators (charged particles)

UNIT – III SOLID STATE AND PHOTOCHEMISTRY

10 Hrs

Solid State : Crystal lattice - laws of crystallography - elements of symmetry - crystal systems - unit cell- space lattice - Bravais lattice - structure of NaCl - structure of CsCl - Miller indices.

Photochemistry: Grothus-Draper's law, Stark Einsteins law - Quantum yield - photosynthesis, phosphorescence - fluorescence - chemiluminescence-photosensitisation

UNIT- IV ELECTRO CHEMISTRY AND GALVONIC CELLS

8 Hrs

Electro Chemistry: Specific and equivalent conductivity - their determination, effect of dilution

Galvonic Cells: EMF and its origin, standard electrode potentials ,reference electrode (SHE& Calomel).Electrochemical series and its applications. Formation of standard cells, cell reaction and lead storage cell.

UNIT - V POLYMERS

7 Hrs

Introduction- classification of polymers: natural and synthetic-types of polymerization- Thermoplastic and Thermosetting polymers- uses of Nylon 6, 6 and Epoxy resins.

Text Books

- Madan. R.D, *Modern Inorganic Chemistry*, 2nd Edition, S.Chand&Company Limited, New Delhi, 2005.
- Puri.B.R, Sharma.L.R, &Pathania.M.S, *Principles of Physical Chemistry*, Millennium Edition, Vishal publishing & Co, Jalandhar, 2004.

Reference Books

- Soni.P.L,*Text Book of Physical Chemistry*, 25th Revised Edition, Sultan Chand, New Delhi, 2004.
- Puri.B.R, Sharma.L.R and Kallia.K.C, *Inorganic Chemistry*,Milestone Publisher, New Delhi, 2003.

UCHR103/ UCHR403 VOLUMETRIC& ORGANIC ANALYSIS

Semester : IV
Category : Allied Practical
Class &Major : II B.Sc Physics

Credit : 2
Hours/ week : 3
Total Hours : 39

Objectives:

To enable the students

- Estimate the presence of chemical substance using Qualitative and Quantitative Analysis.
- Acquire the Skills in Qualitative and Quantitative Analysis.

Volumetric Analysis

1. Estimation of sodium hydroxide standard sodium carbonate
2. Estimation of HCl . using standard oxalic acid
3. Estimation of oxalic acid by KMnO_4 using standard oxalic acid
4. Estimation of borax- std sodium carbonate
5. Estimation of Ferrous sulphate – std – Mohrs salt solution

Qualitative Analysis :

Reaction of the following functional group

Aldehyde (Aromatic), ketone (Aliphatic & Aromatic), Carboxylic acid (mono & di) , carbohydrate (reducing) & phenol, Aromatic primary amine, Amide & diamide. Systematic analysis of organic compound containing one functional group & characterization by confirmatory tests.

Reference Books

- Ramanujam.V.V, *Inorganic Semi Micro Qualitative Analysis*,The National Publishing Company, 2008.
- Thomas.A.O, *Practical chemistry*, 2nd edition, Scientific Book Center, Cannanore, 2006.
- Venkateswaran.V, Veerasawamy.R &Kulandaivelu.A.R, *Basic Principles of practical Chemistry*, 2nd edition, S. Chand & Sons Publications, New Delhi, 2008.

UCHE302 COSMETICS&DETERGENTS

Semester	: III	Credit	: 2
Category	: Non Major Elective	Hours/ week	: 4
Class & Major	: II UG	Total Hours	: 52

Objectives:

To enable the students

- Develop the basic knowledge about commercial products
- Gain the practical training in commercial product analysis
- Be aware of the quality of the commercial product.

UNIT - I

10 Hrs

House hold products- soaps – saponification of oils and fat. Manufacture of soaps .Formulation of toilet soaps. Different ingredients used. Their functions Medicated soaps . Herbal soaps. Mechanism of action of soaps .soft soap. shaving soaps& creams . ISI Specification . Testing procedure / limits

Detergents - Anionic detergent – miniature of LAB(linear alkyl benzene sulphonation on LAB – preparation of acid slurry . different ingredients in the formulation of detergent powder & soaps.Liquid detergents.foam boosters.AOS(alpha olefin sulphonates).,cleaning powder.

UNIT-II

12 Hrs

Cationic detergents-Examples.manufacture and applications.Non-ionic detergents- Examplesmanufacture of ethylene oxide condensate.Mechanism of action of

detergents.Comparison of soaps and detergents.Biodegradation-environmental effects.ISI specifications/limits.

UNIT-III

15 Hrs theory+practical 18 Hrs

Preparations of cosmetics-manufacture of SLS and SLES.Ingredients.FunctionsDifferent kinds of shampoos-anti-dandruff,anti-lice,herbal and baby shampoos.Hair dye.Manufacture of conditions.Coco beraines or coco diethanolamides-ISI specifications.Testing procedures and limits.Face and skin powders-ingredients,functions.Differents types.Snows and face creams. Chemicalingredients used.Antirespriants. Sun screen preparations.UV absorbers.Skin bleaching agents.Depilatories.Turmeric and neem preparations.

Vitamin oil.nail polishes-nail polish removers.Article removers.lipstick,ronghes,eye brow pencils.ingredients and functions-hazards.ISI specifications.

UNIT-IV

7 Hrs

Leading firms,brand names,choosing the right product. Packing regulations.Marketing.Licensing-drug license-legal aspects.GMP-ISO 9000/12000-consumer education.Evaluation of theproduct-advertisement.

Text Books

- Bhatia.S.C,*Perfumes,soaps,Detergents and cosmetics*,Vol.2,CBSPublishers and Distributors, 2001.
- Peter.H.Rossi,Lipsy.W,Howard.E.freeman,*evaluation: ASystamaticApproach*,7th Edition, Sage publications, Inc, 2003.

Reference books

- *Hand books on soaps,Detergents and Slurry*,NIIR,2nd Edition,2008.
- Mithal,BM,saha,RN,VallabhPrakashan,*Handbook of Cosmetics*, New Delhi 2000.
- Milady,*Text Book of Cosmetology*, Milady publishing, 1994.

III and IV Evaluation Component of CIA

Semester	Course Code	Course Title	Component-III	Component-IV
III	UCHM303	General Chemistry –III	Mechanism writing	Seminar
	UCHM304	Separation & Purification Techniques	Power Point presentation	Assignment
	UCHE302	Cosmetics and Detergents	Assignment	Seminar
IV	UCHM403	General Chemistry –IV	Assignment	Problem solving
	UCHM404	Instrumental Methods of Analysis	Power Point presentation	Seminar
	UCHA402	Chemistry – II	Assignment	Seminar

COURSE PROFILE M.Sc Chemistry

Semester	Category	Course Code	Course Title	Contact Hrs/Week	Credits	
					Min	Max
I	Core-I	PCHM107	Organic Chemistry-I	5	4	4
	Core-II	PCHM108	Inorganic Chemistry-I	5	4	4
	Core-III	PCHM109	Physical Chemistry-I	5	4	4
	Core Practical-I	PCHR203	Organic Practical	5	-	-
	Core Practical-II	PCHR204	Inorganic Practical	5	-	-
	Non-Major Elective			5	4	4
Total				30	16	16
II	Core-IV	PCHM204	Organic Chemistry-II	5	4	4
	Core-V	PCHM205	Inorganic Chemistry-II	5	4	4
	Core-VI	PCHM206	Physical Chemistry-II	5	4	4
	Core Practical-I	PCHR203	Organic Practical	5	5	5
	Core Practical-II	PCHR204	Inorganic Practical	5	5	5
	Non-Major Elective			5	4	4
	Service Learning	PCHX201	Vermicomposting	-	1	1
Total				30	27	27
III	Core-VII	PCHM301	Organic Chemistry-III	6	5	5
	Core-VIII	PCHM302	Inorganic Chemistry-III	5	4	4
	Core-IX	PCHM303	Physical Chemistry-III	5	4	4
	Core-X	PCHM305	Research Methodology	5	4	4
	Core Practical – III	PCHR401	Physical Chemistry Practical	5	-	-
	Core	PCHP401	Project	2	-	-
	Value Education	PSWV301	General Studies	2	1	1
Total				30	18	18
IV	Core-XI	PCHM404	Organic Chemistry-IV	5	4	4
	Core-XII	PCHM402	Inorganic Chemistry-IV	5	4	4
	Core-XIII	PCHM405	Physical Chemistry-IV	5	4	4
	Core-XIV	PCHM406	Nanotechnology and Nano Materials	4	4	4
	Core Practical – III	PCHR401	Physical Chemistry Practical	5	6	6
	Core	PCHP401	Project	4	6	6
	Value Education	PSWV402	Women's Studies	2	1	1
Total				30	29	29
Total				120	90	90

Extra credit Earning Provision

Semester	Category	Course code	Course Title	Hours/Week	Credits	
					Min	Max
III	Self Study	PCHS306	Textile Chemistry	--	--	1

PCHM301 ORGANIC CHEMISTRY- III

Semester	: III	Credits	: 4
Category	: Core VII	Hours/Week	: 6
Class & Major	: II M.Sc Chemistry	Total Hours	: 65

Objectives

To enable the students

- Understand the various spectroscopic methods to interpret the structure of the compounds
- Apply the gained knowledge from Alkaloids to extract it from natural products.

UNIT-I UV and IR Spectroscopy 13 Hrs

UV-Visible spectroscopy: Types of electronic transitions, Chromophores & Auxochromes, Factors influencing positions & intensity of absorption bands, Absorption spectra of dienes, polyenes & unsaturated carbonyl compounds, Woodward – Fischer rules.

IR spectroscopy – vibrational frequencies & factors affecting them, identification of functional groups, intra & intermolecular Hydrogen bonding, Finger Print Region, Far IR region, Metal Ligand Stretching vibrations.

UNIT-II NMR Spectroscopy 15 Hrs

Nuclear Spin, Magnetic moment of a nucleus, Nuclear energy levels in the presence of Magnetic field relative populations of energy levels, Macroscopic magnetization – Basic principles of NMR experiments – CW & FT NMR – ^1H NMR – Chemical Shift & Coupling constant – Factors influencing Proton Chemical Shift & Vicinal Proton – Proton Coupling constant, ^1H NMR spectra of simple organic molecules such as $\text{CH}_3\text{CH}_2\text{OH}$, CH_3CHO etc., AX & AB spin system – Spin decoupling – Nuclear Overhauser effect – Chemical exchange. ^{13}C NMR – Proton decoupled & Half Resonance ^{13}C NMR – Factors affecting ^{13}C chemical shift, ^{13}C NMR spectra of simple organic molecules.

UNIT-III Mass Spectrometry 13 Hrs

Instrumentation – Resolution, EI and CI methods – Base peak, isotopic peaks, metastable peak, parent peak, determination and use of molecular formula, recognition of molecular ion peak – FAB. Fragmentation–General rules – Pattern of fragmentation for various classes of compounds, McLafferty rearrangement. Importance of metastable peaks.

UNIT-IV Heterocyclic Compounds 12 Hrs

Nomenclature of heterocyclic compounds having not more than one hetero atoms such as Oxygen, Nitrogen & Sulphur. Synthesis, reactivity and applications of the following heterocycles. Pyrazoles, Oxazoles, Pyridazines, Pyrimidine & Pyrazines. Identification of organic compounds like 1,3,5-trimethyl benzene, cinnamaldehyde, pyridine, isopropyl alcohol, acetone, n-propylamine, benzylbromide & phenylacetone by spectroscopic methods.

UNIT-V Alkaloids 12 Hrs

Occurrence, Nomenclature, Classification and isolation of alkaloids - General methods of Structural elucidation. Structural elucidation of Papaverine, Cocaine, Morphine and Conine.

Text Books

- Finar.I.L, *Organic Chemistry*, Vol-I&II, Fifth Edition, ELBS Publication, 2006.
- Kemp.W, *Organic Spectroscopy*, McMillan Ltd., 2001.
- Silverstein.R.M, G.D.Bassler & Monsu, *Spectrometric Identification of Organic Compounds*, John Wiley & Sons, New York, 2004.

Reference Books

- Dyer.J, *Applications of Organic Spectroscopy*, Prentice & Hall of India Pvt Ltd., New Delhi, 1980.
- Mukerjee.S.M & Singh.S.P, *Organic Reaction Mechanism*, McMillan India Ltd., Chennai, 1990.
- Gurdeep R. Chatwal, "Organic chemistry of Natural products", Volume I & II Himalaya Publishing House, New Delhi, 2009.

PCHM302 INORGANIC CHEMISTRY- III

Semester	: III	Credit	: 4
Category	: Core VIII	Hours/week	: 5
Class & Major	: II-M.Sc Chemistry	Total hours	: 65

Objectives

To enable the students

- Know about the application of Nuclear Chemistry in various fields
- Understand the properties & applications of f-block elements.

Interpret the spectra for Inorganic compounds.

UNIT-I THE CHEMISTRY OF LANTHANIDES AND ACTINIDES 12 Hrs

Lanthanides and actinides - Occurrence, isolation Position in the periodic table, lanthanide contraction, oxidation state, color, spectral, magnetic characteristics, coordination numbers, stereochemistry, nuclear and non-nuclear applications.

UNIT-II NUCLEAR CHEMISTRY-I 10 Hrs

Subatomic particle, isotope, isotone, isobar, nuclear forces, meson theory of nuclear forces, stability of the nucleons-N/P ratio and stability belt, liquid drop model, shell and combined model of the nucleus. Mass defects and Binding energy. Natural and artificial radioactivity. Radioactivity disintegration, Group displacement law, radioactive series, Trans uranium element.

UNIT-III NUCLEAR CHEMISTRY-II 13 Hrs

Nuclear transmutation, classification of nuclear reactions- elastic, inelastic, spallation, capture, fission and fusion reaction, Q-value of nuclear fission, mechanism and fission bomb. Nuclear fusion-Mechanism, stellar energy and Hydrogen bomb. Modes of radioactive decay – detection and determination of activity by Cloud Chamber and Geiger Muller Counter. Nuclear reactors – Fast Breeder reactors, particle accelerators, Cyclotron and Synchrotron. Neutron Activation Analysis, isotopic dilution analysis, Dosimetry.

UNIT - IV APPLICATIONS OF ELECTRONIC AND MICROWAVE SPECTROSCOPY 15 Hrs

Electromagnetic radiation, quantum mechanical approach - transition probabilities: Einstein coefficient, energies of atomic and Molecular transitions, Selection rule, Morse potential energy diagram, electronic transitions, polarized absorption spectra. Nature of absorption spectra, of transition metal complexes Basic concept, rotation spectra of simple inorganic compounds, Classification of molecules, rigid rotor model, effect of isotopic substitution on transition frequencies & intensities non rigid rotor, Stark effect nuclear and electron spin interaction.

UNIT- V APPLICATIONS OF INFRARED SPECTROSCOPY 15 Hrs

Molecular vibrations, force constants, Molecular vibrations and absorption of Infrared radiations Raman Spectroscopy, polarized Raman lines, Use of symmetry considerations to determine the no. of lines in IR and Raman Spectra, Spectra of gases, applications of Raman and Infrared spectroscopy. Selection rule in Inorganic structure determinations, Hydrogen bonding and infrared spectra, metal ligand and related vibrations

Text Books

- Arniker .H.J, “ Nuclear chemistry”, wiley Eastern Co, II Edition , 2000.
- Wahid U.Malik, G.D.Tuli & R.D.Madan, “Selected Topics in Inorganic Chemistry”, S.Chand & Company Ltd., New Delhi,2010.
- Nakamoto. K, Infrared and Raman Spectra of Inorganic and Coordination Compounds, (5th edn.), John Wiley (1997).

Reference Books

- Maheshwar Sharma & Madhuri Sharma, “Nuclear chemistry”, Ane Books Pvt. Ltd, 2009.
- Pavia. Lampman, Kriz, Vyvyan, “Introduction to Spectroscopy”, 4th ed., cengage learning, 2009.
- Singh. G, “Chemistry of Lanthanides and Actinides”, Discovery publishing, 2008.

PCHM303 PHYSICAL CHEMISTRY-III

Semester	: III	Credit	: 4
Category	: Core IX	Hours/Week	: 5
Class&Major	: II M.Sc Chemistry	Total Hours	: 65

Objectives:

To enable the students

- Acquire the fundamental knowledge in the spectroscopy
- Know about the function of the catalysts and its surface action and apply it for research work.

UNIT-I SURFACE CHEMISTRY 13 Hrs

Kinetics of surface reactions: Physical and chemical adsorption–adsorption isotherms–types of adsorption isotherms–Langmuir adsorption isotherm . B.E.T theory for multilayer adsorption–measurement of surface area – Mechanism of heterogeneous catalytic reactions. Adsorption coefficient and its significance.

UNIT-II CATALYSIS

13 Hrs

Acid Base catalysis – mechanism of acid-base catalysed reaction – Catalysis by enzymes – rate of enzyme catalysed reactions – effects of substrate concentration, pH and temperature on enzyme catalysed reactions – inhibition of enzyme catalysed reactions.

UNIT - III FUNDAMENTALS OF SPECTROSCOPY

10 Hrs

Electromagnetic radiation, wave length, wave number, frequency, energy, Interaction of radiation with matter, absorption laws, measurement of absorption intensity, chromophore, auxochrome, absorption and intensity shifts, types of absorption bands and emission spectroscopy.

UNIT - IVELECTRONIC SPECTROSCOPY

14 Hrs

Electronic spectra of molecules: Born-Oppenheimer approximation, Franck-Condon Principle, selection rules, dissociation energy and dissociation products, per dissociation, spectrum of molecular hydrogen. Emission spectroscopy: fate of electronically excited molecules-dissociation, reemission, fluorescence, phosphorescence, emission spectra of molecules.

UNIT-V ROTATIONAL AND VIBRATIONAL SPECTROSCOPY

15 Hrs

The rotation of molecules, rotational spectra-rigid diatomic molecule, intensity of spectral lines, selection rules, effect of isotopic substitution. Diatomic molecules as non-rigid rotors. Polyatomic molecules-linear, symmetric and asymmetric top molecule. Stark effect.

Vibrating diatomic molecule: energy of diatomic molecules as simple harmonic oscillator- energy levels, vibrational transitions, selection rules; anharmonic oscillator-energy levels, selection rules, vibrational transitions. - Diatomic vibrating rotator: Born-Oppenheimer approximation, vibration of polyatomic molecules-fundamental vibrations, linear molecules, symmetric top and asymmetric top molecules.

Text Books

- Banwell .C. N and McCash E. M., Fundamentals of Molecular states – Jablonski diagram – Radiative & Non- Radiative processes –Fluorescence, Chemiluminescence & Spectroscopy, 4th ed., Tata McGraw Hill, New Delhi, 2007.
- Atkins .P and J. de Paula, Physical Chemistry, 7th ed., Oxford University Press, Oxford, 2002.

Reference Books

- Raman. K. V, Gopalan .R and Raghavan. P. S, Molecular Spectroscopy, Thomson and Vijay Nicole, Singapore, 2004.
- Drago .R. S, Physical Methods in Chemistry; Saunders: Philadelphia, 2008.
- Gabor A. Somorjai Yimin Li, “Introduction to Surface chemistry and Catalysis”, 2nd ed., John Wiley & Sons, 2010

PCHM305 RESEARCH METHODOLOGY

Semester	: III	Credits	: 4
Category	: Core X	Hours/Week	: 5
Class & Major	: II M.Sc. Chemistry	Total hours	: 65

Objectives:

To enable the students

- Identify the research problems
- Analysis of data using Chem softwares.
- Drafting of research reports efficiently

UNIT-I LITERATURE SURVEY 13 Hrs

Nature and importance of research - aims, objective, principles and problems - selection of research problem - survey of scientific literature - primary and secondary sources - citation index for scientific papers and journals - patents.

UNIT- II PROCESSING OF DATA 13 Hrs

Editing ,Coding,Tabulation-Problems-use of computers in social research-Analysis of data-statistical analysis-Diagramatic and graphic representation-interpretation of research.

UNIT-III STATISTICAL TREATMENT OF ANALYTICAL DATA 13 Hrs

Sampling –Definition, need and types-Sampling errors -Statistical treatment of finite samples - the students test and F testCriteria forrejection of an observation - the Q test, significant figures and computation rules - data plotting - least square analysis.

UNIT - IV CHEMISTRY STRUCTURAL SOFTWARE 11 Hrs

Chem Sketch, Chem draw, Chem Doodles

UNIT-V SCIENTIFIC WRITING 15 Hrs

Internet source- e Books, e- Journals, Thesis writing, Special Website- Information and retrieving Chemical compound search - Conventions of writing - the general format - page and chapter format - Revising editing and evaluating the final product - proof reading - Meanings and examples of commonly used abbreviations.

Text Book

- Kothari. C.R, Research Methadology- Methods and techniques, New Wiley Eastern Ltd., New Delhi, 2009.
- Paneerselvam, Research Methadology, R. Prentice hall of India, New Delhi, 2004.

Reference Book

- Anderson. J, Durston .H.M and Poole. M, “*Thesis and assignment writing*”:, Wiley Eastern Ltd., (2007).
- Suresh Chandra, Mohit kr. Sharma, “*Research Methodology*”, Alpha science, Oxford, 2013.

PCHR401 PHYSICAL CHEMISTRY PRACTICAL-I

Semester	: III & IV	Credit	: 6
Category	: Core Practical -III	Hours/Week	: 5+5
Class &Major	: II M.Sc Chemistry	Total Hours	: 130

Objective:

To enable the students

- Understand some theoretical concepts by experimental methods
- Interpret the results in accurate manner

Phase rule

- Binary system of Naphthalene & Biphenyl
- Binary system of Naphthalene & M-dinitrobenzene
- Three component System(CH_3COOH , H_2O & CHCl_3)

Kinetics

- Hydrolysis of Ester
- KI Vs $\text{K}_2\text{S}_2\text{O}_8$
- I_2 Vs CH_3COCH_3 (By Calorimetric method)
- Comparison of Strength of two Acids.

Partition Co-efficient

- Instability constant ($\text{KI}_3 = \text{KI} + \text{I}_2$)
- Strength of KI

Potentiometry

- Mixture of acids Vs Strong base
- FAS Vs $\text{K}_2\text{Cr}_2\text{O}_7$
- Determination of dissociation constant of weak acid
- Sparingly soluble salts BaSO_4 (concentration cell)

Conductometric

- Mixture of acids Vs NaOH
- Verification of Onsager's theory
- Degree of dissociation & dissociation constant of a weak electrolyte
- Determination of solubility of a sparingly soluble salts

Polarimeter

- Inversion of Sucrose

Text Book

- Alexander Findlay and Kitcher. J.A, "Practical physical chemistry", Longmans, Green, 2010.

Reference Book

- Shoemaker .D.P and Garland.C.W, "Experiment physical chemistry", 8th ed., Mc Graw-Hill, New York, 2009.

PCHM404 ORGANIC CHEMISTRY- IV

Semester	: IV	Credits	: 4
Category	: Core XI	Hours/Week	: 5
Class & Major	: II-M.Sc Chemistry	Total Hours	: 65

Objectives:

To enable the students

- Understand the principles to differentiate the Photochemical and Pericyclic reactions.
- Apply the chemistry concepts to categorize the different reagents and rearrangements in organic synthesis.
- Expose the mechanism of writing skill in Retro synthesis reactions.

UNIT- I PHOTOCHEMISTRY

15 Hrs

Absorption of Electromagnetic Radiation-Excited state,Types- Quantum yield - Jablonski diagram : Phosphorescence & Fluorescence- Energy transfer and Photo sensitization- Inter system crossing- photochemical reactions-photoreduction, photo enolisation, cis-trans isomerisation, photo oxidation, photo addition, photoreactions of ketones- Norrish type I & II reactions and Di-Pi methane rearrangement.

UNIT-II PERICYCLIC CHEMISTRY

13 Hrs

Introduction of pericyclic reactions - Conservation of molecular orbital Symmetry - Methods to explain Pericyclic reactions - Electrocyclic reactions (FMO Approach) - Cycloaddition - Cheletropic reactions - Sigmatropic Rearrangement - Correlation Diagram method

UNIT-III MOLECULAR REARRANGEMENT

12 Hrs

Introductory concept of rearrangements, migrating aptitude, memory effect. Pinacol - Pinacolone, Wager- Meerwein, , Favorski, Baeyer - Villiger, Wolf, Stevens (in cyclic systems) Von Richter rearrangements, Hoffman, Curtius, Lossen, Schmidt, Beckman, Benzil-Benzilic, Benzidine , Fries and cope rearrangement.

UNIT-IV MORDERN REAGENTS FOR ORGANIC SYNTHESIS

13 Hrs

CrO₃, peracids, Osmiumtetroxide, DDQ, Seleniumdioxide, DCC, DMSO, aluminium triisopropoxide, Diazomethane, LAH, NaBH₄, organoboranes, , NBS, LTA, Wittig reagent. Pd compounds- Heck & Suzuki coupling.

UNIT-V RETROSYNTHESIS

12Hrs

An introduction to retero synthesis - Synthons, Synthetic equivalent, Umpolung-Target molecule, Functional group interconversion, Disconnection approach - One group disconnection - Disconnection of alcohols, olefins and ketones - Logical and illogical disconnection, Two group disconnection- 1,2 - 1,3 - 1,4 - 1,5 and - Deoxygenated skeletons and dicarbonyls. Retero Diels Alder reaction, Reterosynthesis .

Text books

- Jonathanclayden, Nick Greeves and Warrner Stuart, Organic Chemistry, Oxford University Press, Oxford, UK, 2012.
- Jerry March, *Advanced Organic Chemistry*, 6th edition, John Wiley & Sons, New York, 2007.
- Ahluwalia .V.K, *Organic Reaction Mechanism*, 4th edition, Narosa Publishers, 2011.

Reference books

- Coyle .J.D, *Organic Photo Chemistry*-Wiley,2004
- Aggarwal. O.P, “ *Reaction and Reagents in organic chemistry*”, 4th edition, Goyle publications, 2004.
- Gaikwad .N.J, Chaudari R.Y, Patil V.R., *Retrosynthetic analysis and synthesis of drugs*, Nirali prakashan Publication, 2006.

PCHM402 INORGANIC CHEMISTRY - IV

Semester	: IV	Credit	: 4
Category	: Core XII	Hours/week	: 5
Class & Major	: II-M.Sc Chemistry	Total hours	: 65

Objectives:

To enable the students

- Understand the basic concept of supramolecular and green chemistry
- Acquire skill to interpret the spectra of NMR,EPR and NQR for inorganic compounds.

UNIT - I APPLICATIONS OF NMR SPECTROSCOPY 15 Hrs

Chemical shift ,Spin Multiplicity, Coupling constant, Spin- spin splitting , Dependence of J on dihedral angle – Vicinal and geminal coupling constants ,Karplus equation , long range coupling constants, ring currents, diamagnetic anisotropy, high resolution NMR spectra of simple molecules. Basic theory of FT–NMR, Relaxation,Broad band decoupling, Off resonancedecoupling and chemical shifts of common functional groups, DEPT spectra, Identification of small compounds based on NMR data. 2D Techniques:1H – 1H COSY, 1H – 13C COSY –and NOESY.

UNIT - II APPLICATIONS OF EPR SPECTROSCOPY 12 Hrs

Electron spin resonance: g value– factors affecting the magnitude of g- values , hyperfine structure, ESR of organic free radicals, ESR of inorganic ions, ESR of simple free radicals in solutions.

UNIT - III APPLICATIONS OF NQR AND MOSSBAUER SPECTROSCOPY 14 Hrs

NQR Spectra of transition metal complexes, metal hyperfine anisotropic spectra. Zero-field splitting, applications. Massbauer-Principles, isomer shift, quadrapole effect of magnetic field, Magnetic hyperfine interactions, Applications of the technique to the studies of (i) bonding and structures of Fe²⁺ and Fe³⁺ compounds including those of intermediate spin, (ii) Sn+2 and Sn+4 compounds, nature of M-Lbond, coordination number, structure and (iii) detection of oxidation state.

UNIT - IV SUPRAMOLECULAR CHEMISTRY 12Hrs

Metalloenes- Electronic structure and bonding in ferrocene- synthesis – physical and spectroscopic properties of metalloenes- reactions and applications of metalloenes- multiple decker sandwich complexes- application of metalloenes in polymers- non-linear optics-medicine- molecular recognition– catalysis.

UNIT - V GREEN CHEMISTRY 12 Hrs

Introduction –Needs and Principles of Green chemistry-Planning of Green synthesis in a chemical lab-Reactions of Green Chemistry- Acyloin condensation using Co Enzyme,thamine-

Aldol condensation of Silyl Enol Ethers in Aqueous media-Bonbier reaction under Sonication-Application-PTC Catalysed synthesis of flavones - preparation of green chemistry-6-hydroxy Carbonyl-3,5-diphenyl-2-cyclohexanone-Solvent less reactions-Microwave reactions-Enzymatic Transformations-Sonification reactions. Sustainable living-Wind Mill, solar energy.

Text Books

- Parish.R. V, *NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry*, Ellis Horwood, New York (1990).
- Ahluwalia.V.K and Varma, "Text book of Green Chemistry", 3rd edition, Ane Books Pvt. Ltd.2013.

Reference Books

- Drago.R. S, *Physical Methods in Chemistry*, Saunders College Publishers (1977).
- Banwell.C. N & McCash.E. M, *Fundamentals of Molecular Spectroscopy*, Tata McGraw-Hill, New Delhi (2006).
- Gokel.W, "Advances in Supramolecular Chemistry", Vol.7, Jai press INC, 2000.

PCHM405 PHYSICAL CHEMISTRY-IV

Semester	: IV	Credit	: 4
Category	: Core XIII	Hours/Week	: 5
Class&Major	: II M.Sc Chemistry	Total Hours	: 65

Objectives:

To enable the students

- Understand the principles of Magnetic, Quadruple and Electron resonance spectroscopy.
- Analyse the samples using different analytical techniques like SEM, TEM, AFM, STM, Polarography and cyclic voltammetry.
- Differentiate cells by using photo analytical techniques.

UNIT - I PRINCIPLES OF MAGNETIC RESONANCE SPECTROSCOPY 15Hrs

Theory of NMR spectroscopy: nuclear spin and magnetic nuclei, nuclear magnetic moment, behavior of a bar magnet in a magnetic field, the NMR transition, relaxation mechanisms. Parameters of NMR- measuring the chemical shift, shielding and deshielding of magnetic nucleus, FT and two dimensional NMR spectroscopy - FIDs, Fourier transformation of ¹³C, ¹⁹F, ³¹P NMR-range of chemical shift values.

Electron paramagnetic resonance spectroscopy: theory of EPR spectroscopy, the position of ESR absorption, g - factor, hyperfine splitting, Zero field splitting, Kramer's degeneracy.

UNIT - II MICROSCOPY TECHNIQUES 15 Hrs

Principle, theory, Instrumentation and Application of Optical microscopy- Scanning electron microscope (SEM) - Transmission electron microscope (TEM)- Atomic force microscope (AFM)- Surface Tunneling microscope (STM)- Energy dispersive X-ray spectroscopy (EDX).

UNIT - III MACROMOLECULES 12 Hrs

Polymerization in homogeneous and heterogeneous phases- Kinetics of polymerization (Ionic and Addition)-kinetics of copolymerization- Mechanism of Polymerization- Chain Initiation- Propagation - Termination-Transfer -Inhibition and Retardation. Properties of

polymers : Molecular weight of polymers - Mw, Mn determination - Light Scattering, Ultra centrifuge - Gel Permeation Chromatography.

UNIT- IV PHOTO ANALYTICAL TECHNIQUES

10 Hrs

Photovoltaic and photogalvanic cells, photoelectrochemical cells, photo assisted electrolytes of water, aspects of solar energy conversion. Radiation chemistry-Interaction of high energy radiation with matter-primary and secondary processes-G value-radialysis of water-hydrated electron.

UNIT-V ELECTRO ANALYTICAL TECHNIQUES

13 Hrs

Polarography – theory,apparatus, DME, diffusion, Kinetic and catalytic currents,current-voltage curves for reversible and irreversible systems, Qualitative and quantitative application to inorganic systems. Amperometric titrations- theory, types of titration curves, Cyclic Voltammetry - theory, instrumentation, differential pulse Voltammetry-principle and instrumentation.

Text Books

- Banwell .C. N and McCash .E. M, Fundamentals of Molecular Spectroscopy, 4th ed., Tata McGraw Hill, New Delhi, 2007.
- Drago. R. S, Physical Methods in Chemistry; Saunders: Philadelphia, 2008.
- Allen J. Bard and Israel Rubinstein, “Electroanalytical chemistry”, vol.22, Marcel Dekker, 2004.

Reference Books

- Atkins. P and J. de Paula, *Physical Chemistry*, 7th ed., Oxford University Press, Oxford, 2002.
- Raman .K. V, Gopalan .R and Raghavan .P. S, *Molecular Spectroscopy*, Thomson and Vijay Nicole, Singapore, 2004.
- Weil .J. A, Bolton .J. R and Wertz .J. E, *Electron Paramagnetic Resonance*; Wiley Interscience: 2005.

PCHM406 NANOTECHNOLOGY AND NANO MATERIALS

Semester	: IV	Credit	: 4
Category	: Core XIV	Hours/Week	: 4
Class & Major	: II-M.Sc. Chemistry	Total Hours	: 52

Objectives:

To enable the students

- Understand the concepts of nanomaterials and their Properties.
- Enhance the concepts using synthesis of nanomaterials.
- Implement the applications of nanodevices .

UNIT – I NANOMATERIALS AND TECHNOLOGY

10Hrs

Basic concepts of Nano science and technology – Quantum wire – Quantum well – Quantum dot: Basic concepts and applications of quantum dots – Properties and technological advantages of nanomaterials – Carbon nanotubes and applications

UNIT - II SYNTHESIS OF NANOMATERIALS **10Hrs**

Material processing by Sol – Gel method, Chemical Vapour Deposition (CVD), Photochemical Synthesis, Spray Pyrolysis and hydrolysis method - Biological synthesis of nanomaterials – Microwave Synthesis of nanomaterials

UNIT - III PROPERTIES OF NANOMATERIALS **8Hrs**

Basic principles Electrical and mechanical properties, Nano photonics, Nano magnetism, Nano catalysis, Nano electronics

UNIT - IV NANOSTRUCTURED MOLECULAR MATERIALS **9Hrs**

Introduction; Building blocks - Self-assembly - Principles - Methods to Prepare and Pattern Nanoparticles - Templated Nanostructures - Liquid Crystal Mesophases - Macromolecular interfaces.

Nanocomposites– Polymer based nanocomposites – nanoscale fillers – processing of polymer nanocomposites – Properties of polymer nanocomposites. Core-Shell structured nanocomposites - morphology and fractal model of hybrid nanocomposites.

UNIT - V NANODEVICES AND APPLICATIONS **15Hrs**

Organic and Inorganic Nanotechnology Enabled Sensors Nanoparticles in Medicine - Size-Dependent Effects of Magnetic Particles – Utilisation of Iron Oxide Nanoparticles in *in-vitro and in-vivo* Investigations Naturally Occurring Food Nanosubstances and Nanostructures - Designing Food Nanostructures - Nanomaterials for (Health)food Applications - Nano-sized Food Ingredients and Additives in Relation to Digestion of Food - Nanotechnologies in Food Packaging Nanotechnology enabled Solar Cells.

Text Books

- Hari Singh Nalwa, “*Nanostructured Materials and Nanotechnology*”, Academic Press, 2002
- Mark Ratner and Daniel Ratner by Nanotechnology by Pearson Education.

Reference Books

- Robert W. Kelsall, Ian W. Hamley and Mark Geoghegan, Nanoscale Science and Technology, John Wiley & Sons, Ltd., UK, 2005
- Nan Yao and Zhong Lin Wang, Handbook of Microscopy for Nanotechnology, by Kluwer Academic Press (2005)
- Nanostructured Materials for Electrochemical Energy Production and Storage, Springer, 2009

PCHR401 PHYSICAL CHEMISTRY PRACTICAL-I

Semester	: III & IV	Credit	: 6
Category	: Core Practical -III	Hours/Week	: 5+5
Class&Major	: II M.Sc Chemistry	Total Hours	: 130

Objective:

To enable the students

- Understand some theoretical concepts by experimental methods.
- Interpret the results in accurate manner.

Phase rule

- Binary system of Naphthalene & Biphenyl
- Binary system of Naphthalene & M-dinitrobenzene
- Three component System(CH_3COOH , H_2O & CHCl_3)

Kinetics

- Hydrolysis of Ester
- KI Vs $\text{K}_2\text{S}_2\text{O}_8$
- I_2 Vs CH_3COCH_3 (By Calorimetric method)
- Comparison of Strength of two Acids.

Partition Co-efficient

- Instability constant ($\text{KI}_3 = \text{KI} + \text{I}_2$)
- Strength of KI

Potentiometry

- Mixture of acids Vs Strong base
- FAS Vs $\text{K}_2\text{Cr}_2\text{O}_7$
- Determination of dissociation constant of weak acid
- Sparingly soluble salts BaSO_4 (concentration cell)

Conductometric

- Mixture of acids Vs NaOH
- Verification of Onsager's theory
- Degree of dissociation & dissociation constant of a weak electrolyte
- Determination of solubility of a sparingly soluble salts

Polarimeter

- Inversion of Sucrose

Text Book

- Alexander Findlay and Kitcher. J.A, "Practical physical chemistry", Longmans, Green, 2010.

Reference Book

- Shoemaker .D.P and Garland.C.W, "Experiment physical chemistry", 8th ed., Mc Graw-Hill, New York, 2009.

PCHS306 TEXTILE CHEMISTRY

Semester	: III	Credits	: 1
Category	: Self Study	Total Hours	: 30
Class&Major	: IIM.Sc Chemistry		

Objectives:**To enable the student**

- Acquire the knowledge about polymer synthesis and fibers used in textile industries
- Distinguish Natural fibers from Synthetic fibers.
- Examine the chemical structure of dyes and the bleaching process.

UNIT –I POLYMER CHEMISTRY**6 Hrs**

Polymer, methods of polymerization, polymerization process-Definition of co-polymer, oligomer, graft-co-polymer-Degree of Polymerization. Orientation and crystallinity of polymers their influence on fibre properties.

UNIT – II CHEMISTRY OF NATURAL FIBRES**6 Hrs**

Cellulosic fibres - cotton, Jute, flax. Chemical composition, molecular structure, manufacturing and uses. Action of acids and alkalis, hydrocellulose and oxycellulose. Protein fibres - Wool & silk. Chemical composition, molecular structure, manufacturing and uses; physical & chemical properties action of acids & alkalis.

UNIT - III CHEMISTRY OF SYNTHETIC FIBRES**6 Hrs**

Defination & classification of fibres, Chemistry of synthetic fibres: Regenerated Cellulosic fibres: - Viscose-rayon, cuprammonium rayon, cellulose acetate, other Synthetic Fibres: - Polyester (Terylene, Dacron) Polyamide (Nylon 6, Nylon 66) and acrylonitrile fibres.

UNIT-IV BLEACHING**6 Hrs**

Scouring, definition of bleaching. Classification of bleaching methods, different bleaching agents, their relative merits and demerits, hypochlorite, chlorite, peroxide bleaching, their mechanisms, methods of bleaching, role of chemicals used in bleaching.

UNIT-V TEXTILE DYES**6 Hrs**

Witt's Theory and Modern theory of colour. Introduction to Dyeing: Classification of dyes according to chemical constitution; Application. Phenophthalein, Malachite green, Azo dyes- Methyl orange, Methyl red, Congo red. Vat Dye- indigo, Mordant dye-Alizarin.

Text Books.

- Chatterjee and Gupta, “*Textile Science and Technology*” (Volume 13). Elsevier: East Brunswick, USA (2013).
- Dianne .N.Epp, *The Chemistry of Natural Dyes*, 4th Edition, 2012.
- *Textile Chemistry*, Nova Science Publishers, University of Michigan, 2007.

Reference Books

- Shenai, V.A. “*Introduction to the Chemistry of Dyestuffs*”, Sevak, Prakashan (2014).
- Mather, R.R., & Wardman, R.H.” *The Chemistry of Textile Fibres*”. RSC publishing, USA (2011).

III and IV Evaluation Component of CIA

Semester	Course Code	Course Title	Component-III	Component-IV
III	PCHM305	Research Methodology	Assignment	Seminar
IV	PCHM404	Organic Chemistry-IV	Mechanism Writing	Seminar
	PCHM405	Physical Chemistry-IV	Problem Solving	Seminar
	PCHM406	Nanotechnology and NanoMaterials	Assignment	Seminar

DEPARTMENT OF MATHEMATICS

PREAMBLE

UG : Course Profile, list of courses offered to the other departments & the syllabi of courses offered in the III and IV semesters (With effect from 2015-2018 batch onwards)

PG : Course Profile, list of courses offered to the other departments & the syllabi of courses offered in the III and IV semesters (With effect from 2015-2018 batch onwards)

COURSE PROFILE B.Sc. (Mathematics)

Semester	Part	Category	Course code	Course Title	Contact Hrs/week	Credit	
						Min	Max
I	I	Language	UTAL105/ UTAL106/ UHIL101/ UFRL101	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I / French-I	4	2	3
	II	English	UENL107/ UENL108	Basic English-I/ Advanced English-I	5	3	4
	III	Core I	UMAM103	Fundamentals of Mathematics	2	1	1
	III	Core II	UMAM104	Differential calculus	5	4	4
	III	Core III	UMAM105	Analytical Geometry	6	5	5
	III	Allied	UMAA111	Mathematical Statistics	6	5	5
	IV	Value Education			2	1	1
TOTAL					30	21	23
II	I	Language	UTAL205/ UTAL206/ UHIL201/ UFRL201	Basic Tamil II/ Advanced Tamil-II/ Hindi-II / French-II	4	2	3
	II	English	UENL207/ UENL208	Basic English II/ Advanced English II	5	3	4
	III	Core IV	UMAM204	Integral Calculus	5	5	5
	III	Core V	UMAM402/ UMAM205	Graph Theory	5	4	4
	III	Core VI	UMAM606/ UMAM206	Discrete Mathematics	5	4	4
	IV	Non Major Elective			4	2	2
	IV	Soft Skill			2	1	1
	V	Extension Programme/ Physical Education			-	1	2
TOTAL					30	22	25
III	I	Language	UTAL305/ UTAL306/ UHIL301/ UFRL301	Basic Tamil III/ Advanced Tamil-III/ Hindi-III / French-III	4	2	3
	II	English	UENL307/ UENL308	Basic English III/ Advanced English III	5	3	4
	III	Core VII	UMAM306	Differential Equation	5	4	4

	III	Core VIII	UMAM307	Introduction to Probability Theory	4	4	4
	III	Allied	UCSA303	Mathematical Programming in C	3	3	3
	III	Allied Practical	UCSR305	Mathematical Programming in C Practical	3	2	2
	IV	Non Major Elective			4	2	2
		Value Education			2	1	1
TOTAL					30	21	23
IV	I	Language	UTAL405/ UTAL406/ UHIL401/ UFRL401	Basic Tamil IV/ Advanced Tamil-IV/ Hindi-IV/ French-IV	4	2	3
	II	English	UENL407/ UENL408	Basic English IV/ Advanced English IV	5	3	4
	III	Core IX	UMAM405	Applications of Transforms	4	3	3
	III	Core X	UMAM406	Mechanics	5	4	4
	III	Core XI	UMAM404	Mathematical modeling	5	4	4
	III	Allied	UPHA402	Electronics for Mathematics	3	3	3
		Allied Practical	UPHR404	Electronics for Mathematics Practical	2	2	2
	IV	Soft Skill			2	1	1
V	Extension programme/ Physical Education			-	-	2	
TOTAL					30	22	26
V	III	Core XII	UMAM501	Modern Algebra	6	5	5
	III	Core XIII	UMAM505	Sequence And Series	6	5	5
	III	Core XIV	UMAM602/ UMAM507	Complex Analysis	5	5	5
	III	Allied	UCSA507	Object Oriented Programming Using Java	3	3	3
		Allied Practical	UCSR508	Object Oriented Programming Using Java	3	2	2
	III	Allied Optional			5	4	4
	IV	Value Education			2	1	1
TOTAL					30	25	25
VI	III	Core XV	UMAM610	Fuzzy Set Theory	5	5	5
	III	Core XVI	UMAM608	Operations Research	6	6	6
	III	Core XVII	UMAM604	Linear Algebra	6	6	6
	III	Core XVIII	UMAM607	Real Analysis	6	6	6
	III	Major optional	UMAO604	MAT lab for beginners	5	4	4
			UMAO605	Numerical Methods using Java			
	III	Comprehensive Viva	UMAC601		-	1	1

	IV	Soft Skill			2	1	1
	V	Extension programme/ Physical Education			-	-	2
TOTAL					30	29	31
GRAND TOTAL					180	140	153

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course code	Course Title	Contact Hrs/week	Credit	
						Min	Max
II	III	Core	UMAI201	Summer Internship	-	-	1
IV	III	Core	UMAI401	Summer Internship	-	-	1
VI	III	Core	UMAM609 UMAS601 UMAS602 UMAS603	Mini project Fourier and Z –Transforms Simulation Number Theory(Self study Paper)	-	-	1

COURSES OFFERED TO OTHER DEPARTMENTS-UGALLIED

Class & Major	Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit	
						Min	Max
I B Com & I BCom (CA)	I	Allied	UMAA112	Business Mathematics	5	4	4
I B.SC PHY			UMAA104	Mathematics for Physics-I	5	5	5
I BCA			UMAA110	Mathematical Methods I	5	4	4
I B.Sc (CS) & I B.Sc ISM			UMAA113	Statistical Methods	6	4	4
I B.Sc (CS)	II		UMAA218	Mathematics for computer Science	6	4	4
I B.A (C.E)			UMAA105/ UMAA213	Statistics-I	5	4	4
II BCA			UMAA216	Mathematical Methods II	5	4	4
I B.SC PHY			UMAA212	Mathematics for Physics-II	5	5	5
II B.Sc Chem	III		UMAA304	Algebra, Differential Calculus and Trigonometry	5	5	5
II B.Sc BIO			UMAA305	Bio-Statistics	5	4	4
II B.A(CE)			UMAA205/ UMAA303	Statistics-II	5	5	5
II BBA/ II B.COM/ II B.COM CA			UMAA211/ UMAA403/ UMAA107/ UMAA301	Business Statistics	5	4	4
II B.Sc Chem	IV	UMAA406	Integral Calculus, Laplace Transform And Ordinary Differential Equations	5	5	5	
II BBA		UMAA505/ UMAA410	Quantitative techniques for Business	5	4	4	

NON - MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Contact Hrs/ week	Credit
II	IV	Non Major Elective	UMAE204	Basic Mathematics for Science	4	2
			UMAE202	Mathematics for Business and Decision Making	4	2
III			UIDE302/ UMAE302	Numerical Methods using C++	4	2
			UMAE402/U MAE306	Operations Research for Managers	4	2
			UMAA501/U MAE305	Statistical Data Analysis through SPSS	4	2
			UIDE304	Basics for TANCET	4	2
			UMAE502/U MAE308	Mathematics for Competitive Exams	4	2

ALLIED OPTIONAL

Class & Major	Semester	Category	Course Code	Course Title	Contact Hrs/ week	Credit	
						Min	Max
III UG	V	Allied Optional	UMAA502/ UMAA510 UMAA512	Space Science / Discrete Mathematical Structures	5	4	4

UMAM306 DIFFERENTIAL EQUATIONS

Semester : III **Credits** : 4
Category : Core VII **Hours/Week** : 5
Class & Major : II B.Sc Mathematics **Total Hours** : 65

Objectives:

To enable the students

- Understand linear, non- linear ordinary and partial differential equations.
- Classify the Differential Equations.
- Formulate differential equations in geometrical and physical problems.

UNIT – I FIRST ORDER DIFFERENTIAL EQUATIONS 13 Hrs

Linear equations with variable coefficients – separable Equations – Differences between Linear and non-linear Equations – Exact Equations and Integrating factors.

UNIT – II SECOND ORDER DIFFERENTIAL EQUATIONS 12 Hrs

Homogeneous Equations with constant co-efficients – Fundamental solutions of linear homogeneous equations – linear Independence and the Wronskian.

UNIT – III SECOND ORDER DIFFERENTIAL EQUATIONS [CONTD] 13 Hrs

Complex roots of the characteristic Equation – Repeated roots; Reduction of Order – Non-Homogeneous Equations; Method of undetermined Co-efficient – Variation of Parameters.

UNIT – IV LINEAR PARTIAL DIFFERENTIAL EQUATIONS**15 Hrs**

Introduction – Origin of partial differential equations – Lagrange’s method – Working rule for solving $Pp+Qq=R$ by Lagrange’s method.

UNIT – V NON-LINEAR PARTIAL DIFFERENTIAL EQUATIONS**12 Hrs**

Complete integral, particular integral, singular integral and general integral – Special methods of solution applicable to certain standard forms-Standard form I:only p and q present
Standard form II – $z = px+qy+f(p,q)$ – Standard form III only p,q and z present – Standard form IV Equations of the form $f_1(x,p)=f_2(y,p)$

Text Books

- Boyce-Diprima, *Elementary Differential Equations*, John Wiley & sons, Inc, Newyork 2008.
- Raisinghania.M.D, *Ordinary and Partial Differential Equations*, New Delhi.S.Chand and Co 2008.

Reference Books

- Grewal.B.S, *Higher Engineering Mathematics*, New Delhi. Khanna Publishers, 2002.
- Narayanan.S & Manickavachagom Pillay, T.K *Differential Equations and its Applications*, Vishwanathan.S Printers & Publishers pvt ltd., Chennai, 2006.
- Venkatraman.M.K *Engineering Mathematics*, Chennai, Part B National Publishing Company 1999.

UMAM307INTRODUCTION TO PROBABILITY THEORY

Semester	: III	Credit	: 4
Category	: Core VIII	Hours/Week	: 4
Class &Major	: II B.Sc Mathematics	Total Hours	: 52

Objectives:**To enable the students**

- Understand basic ideas and concepts of probability theory.
- Compute conditional probability and conditional expectations.Apply Markov chain for solving real life problems.

UNIT – I INTRODUCTION TO PROBABILITY THEORY**11 Hrs**

Introduction – Sample space and Events – Probabilities defined on events – Conditional Probabilities – Independent events – Bayer’s Formula.

UNIT – II RANDOM VARIABLES**11 Hrs**

Joint Probability distributed random Variable – Distribution of the number of the number of events that occur – Limit theorem.

UNIT – III CONDITIONAL PROBABILITY**10 Hrs**

Introduction – Discrete Case – Continuous Case – Computing Expectations by Conditions.

UNIT – IV CONDITIONAL EXPECTATION**10 Hrs**

Computing Probability by Condition – A List Model – A Random Graph – Uniform Priors, Polya’s Urn Model, and Bose – Einstein Statistics – Mean Time for Patterns – The k-Record Values of Discrete Random Variables – Left Skip Free Random Walks – An identity for Compound random variables

UNIT – V MARKOV CHAINS**10Hrs**

Introduction – Chapman Kolmogorov equation – Classification of States – Limiting Probability

Text Book

- Sheldon M. Ross, *Introduction to probability models*, Elsevier Publication, 10th Edition, 2010.

Reference Books

- Breiman.L, *Probability*, Addison – Wesley , Reading , Massachusetts , 1968.Feller.W , *An Introduction to Probability Theory and its Application*, Volume 1 , John Wiley, New York, 1957

UMAM405 APPLICATIONS OF TRANSFORMS

Semester	: IV	Credits	: 3
Category	: Core IX	Hours/Week	: 4
Class & Major	: II B.Sc Mathematics	Total Hours	: 52

Objectives:**To enable the students**

- Acquire knowledge of Transformation techniques.
- Analyse various Transformations.
- Solve difference equations and differential equations using transforms.

UNIT - I FOURIER SERIES**11Hrs**

Periodic Functions – Bounds of a Function –Continuity of a function – Fourier series – Dirichlet’s conditions – Bernoulli’s generalized formula of integration by parts – Even and odd functions – Half- range series – Change of interval

UNIT- II FOURIER TRANSFORMS**11Hrs**

Definition – Fourier Integral theorem – Complex Fourier transform –Inversion theorem for complex Fourier transform –Properties of Fourier Transforms – Convolution theorem – parseval’s identity – Infinite Fourier Sine and Cosine transforms (without proof) – Properties of Fourier Transforms – Fourier transform derivatives – Applications of to boundary value problems.

UNIT - III LAPLACE TRANSFORMS**10Hrs**

Laplace transforms – Inverse Laplace transforms – Laplace transforms of derivatives of integrals – Applications to solution of differential equations.

UNIT - IV Z-TRANSFORMS**10Hrs**

Definition, example and Properties of Z-transform – The Inverse Z-transform – Convolution theorem – Z- transform of rational functions.

UNIT-V SOLUTIONS OF DIFFERENCE EQUATIONS BY USING Z-TRANSFORM
10Hrs

Power series method, partial fraction method, the inverse integral method – Volterra difference equation of convolution type – Volterra systems

Text Books

- Kandasamy.P & Thilagavathy.K ,” *Mathematics*” Volume II, IV,S.Chand Publications,2005
- Saber N. Elaydi, “*An introduction to Difference Equations*”, Springer Verlag New York, 2005.

Reference Books

- Narayanan.S & Manicavachagom Pillay, “*Calculus*”Volume-I,Viswanathan.S Printers & Publishers Pvt, Ltd.,Chennai,2005

UMAM406 MECHANICS

Semester	: IV	Credits	: 4
Category	: Core X	Hours/Week	: 5
Class &Major	: II B.Sc Mathematics	Total Hours	: 65

Objectives:**To enable the students**

- Understand forces acting on a particle.
- Examine a mechanical system.
- Evaluate the trajectory of a projectile, Circular Motion.

PART – I STATICS**UNIT-I FORCES****13 Hrs**

Introduction – Forces acting at a point – Parallelogram of forces – Triangle of forces – Lami’s theorem, Simple Problems.

UNIT-II FORCES ON A RIGID BODY**10Hrs**

Moment of a force – Moment of a force about a line – Scalar moment, General motion of a rigid body –Equations of motions of a rigid body Kinetic energy of a rigid body.

UNIT-III FORCES ON A RIGID BODY (CONTINUATION)**12 Hrs**

Parallel Forces – Point of application of resultant of many parallel forces – Varignon’s Theorem – Parallel forces at the vertices of a triangle – Couples-Arm and axis of a couple – Resultant of several coplanar forces.

PART – II DYNAMICS

UNIT –IV PROJECTILES

15 Hrs

Motion of Projectile, Nature of trajectory, Results Pertaining to the motion of the Projectile, Simple Problems, Impulse force, Newton’s experimental Law, Direct and oblique Impact of two smooth spheres, Impact of a smooth sphere on a fixed smooth plane Simple Problems.

UNIT - V CENTRAL ORBITS

15Hrs

Motion under action of Central forces and Central Orbit, equation of a central orbit, Finding law force and speed of a given orbit the law of force, Simple problems

Text Book

- Duraipandian.P,LaxmiDuraipandian and MuthamizhJayapragasam,*Mechanics*,S.Chand& Co Pvt.Ltd, New Delhi,2006.

Reference Books

- Chatterji.P.N, “*Statics*”,Rajhans Publications,Meerut,1996.
- Loney.S.L, “*Elements of Statics*”,Macmilan India, New Delhi,1982.
- Joseph F. Shelley. “*Vector Mechanics for Engineers*” Volume - I: Dynamics, Tata MC Graw Hill edition, New Delhi.2005.

UMAM404 MATHEMATICAL MODELING

Semester	: IV	Credit	: 4
Category	: Core XI	Hours/Week	: 5
Class & Major	: II B.SC Mathematics	Total hours	: 65

Objectives:

To enable the students

- Classify mathematical models involving differential equations, difference equation, dynamics and graph theory.
- Analyze Mathematical Models for real life problems.

UNIT – I GROWTH AND DECAY MODELS USING ODE

12 Hrs

Ordinary differential equation – Linear growth model – Growth of science and scientists – Non- linear growth and decay models – Diffusion of glucose or a medicine in the bloodstream.

UNIT – II MODELING IN POPULATION DYNAMICS

14 Hrs

Modeling in population dynamics – Prey-predator models – Competition models – Multi-species models– Modeling of epidemics – Simple epidemic models – A model for diabetic-mellitus

UNIT – III MODELING OF PLANETARY MOTION USING SECOND ORDER ODE

14 Hrs

Modeling in second order O.D.E – Modeling of planetary motion – Motion under central force –Circular motion – Elliptic motion of a satellites – Rectilinear motion.

UNIT – IV MODELING THROUGH DIFFERENCE EQUATIONS **13 Hrs**

Modeling through difference equations – Linear difference equation – Obtaining complementary function by use of matrices – Harrod model – Cob-web model – Applications of Actuarial science.

UNIT – V MODELING THROUGH GRAPHS **12 Hrs**

Modeling through graphs – Seven bridge problem – Representing results of tournament – Genetic graph– Food web – Communication network – Matrices associated with a directed graph – Detection of clique – Terms of signed graph.

Text Book

- Kapur J. N, “*Mathematical Modeling*”, Wiley Eastern Limited, New Age International Pvt. Ltd., Reprint 2013.

Reference Books

- Kapur J. N, “*Mathematical Models in Biology and Medicine*”, Oscar Publications, New Delhi, 1985.
- Olink R, “*Mathematical Models in Social and Life Sciences*”, Wiley Publications 2014.

**UMAA304 ALGEBRA, DIFFERENTIAL CALCULUS
AND TRIGONOMETRY**

Semester	: III	Credit	: 5
Category	: Allied	Hours/Week	: 5
Class & Major	: II B.Sc Chemistry	Total Hours	: 65

Objectives:

To enable the students

- Acquire indepth knowledge about Binomial, Exponential and Logarithmic Series.
- Understand the fundamentals of differentiation.

UNIT-I ALGEBRA **15 Hrs**

Binomial theorem for rational index – Exponential and Logarithmic series – summation and simple approximations related to Binomial, Exponential and Logarithmic series.

UNIT-II MATRICES **13 Hrs**

Cayley Hamilton theorem – verification – finding inverse of a matrix using Cayley Hamilton theorem – Eigen values and Eigen vectors.(simple problems only for matrices of order upto 3×3).

UNIT-III DIFFERENTIAL CALCULUS **10 Hrs**

Successive differentiation – Leibnitz theorem and its applications – Jacobian- Concept of polar coordinates radius of curvature in Cartesian coordinates

UNIT-IV TRIGONOMETRIC SERIES **12 Hrs**

Complex numbers-Applications of De-Moivre’s theorem-Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$,- Expansions of $\sin^n \theta$, $\cos^n \theta$ -Expansion of $\sin \theta$, $\cos \theta$, $\tan \theta$ in powers of θ

UNIT-V HYPERBOLIC FUNCTIONS

15 Hrs

Hyperbolic Functions-Inverse Hyperbolic Functions –relation between circular and hyperbolic functions, logarithm of complex numbers.

Text Books

- Narayanan and Manicavachagom Pillay, *Algebra Volume I*, Viswanathan.S Publishers & Printers Pvt. Ltd., Chennai,1996.
- Narayanan and Manicavachagom Pillay, *Calculus Volume I*, Viswanathan.S Publishers & Printers Pvt. Ltd., Chennai, 1994.
- Narayanan.S & Manicavachagom Pillay.T.K, *Trigonometry*, Vishwanathan.S Printers & Publishers Pvt,Ltd., Chennai, 1994.

UMAA305 BIO-STATISTICS

Semester	: IV	Credit	: 4
Category	: Allied	Hours/week	: 4T+1P=5
Class & Major	: II B.Sc., Bio-Chemistry	Total Hours	: 65

Objectives:

To enable the students

- Understand and Practice Statistical Methods
- Apply Statistical techniques for Bio-Sciences.
- Gain analyzing skill in the Field of Experimentation in Biology and Genetics.

UNIT-I STAGES OF STATISTICAL SURVEY AND AVERAGES (12+5) Hrs

Nature and scope of Statistical Methods and their limitations – Collection, Classification and Tabulation of Statistical data – Diagrammatic and Graphical representation of statistical data Measures of Central tendency – Mean, Median, Mode, Geometric Mean, Harmonic mean.

UNIT – II DISPERSION, SKEWNESS AND MOMENTS (10+4) Hrs

Measures of dispersion – Range, Quartile deviation, Mean deviation, Standard deviation - co-efficient of variation – Lorenz curve - Skewness – Karl Pearson’s, Bowley’s and Kelly’s co-efficient of skewness – Skewness and Kurtosis based on moments.

UNIT – III CORRELATION AND REGRESSION ANALYSIS (10+4) Hrs

Correlation Analysis – Scatter diagram – Karl Pearson’s co-efficient of Correlation – Spearman’s Rank correlation coefficient – Co-efficient of Concurrent Deviation- Fitting of straight line of the form $Y = ax + b$ by the method of least squares – Regression Analysis – Regression Lines – Regression Equations

UNIT – IV PROBABILITY, RANDOM VARIABLES AND EXPECTATIONS 10 Hrs

Concept of Probability – Addition and Multiplication theorem of probability – Baye’s Theorem- concept of random variable Distribution function – Definition of probability function for discrete and continuous random variable- mathematical expectation – Chebychev’s inequality-simple problems.

UNIT – V THEORETICAL DISTRIBUTIONS

10 Hrs

Standard distribution – Binomial, Poisson, normal and exponential distributions- Derivation of mean, Variance-properties- Fittings of Distributions.

PRACTICAL

- Presentation of data – Diagrams & Graphs
- Calculation of Measures of central tendency – Mean, Median, Mode, Geometric mean, Harmonic mean
- Calculation of Measures of Dispersion – Range, Quartile deviation, Mean deviation, standard deviation and its relative measures and Skewness
- Karl Pearson's correlation coefficient
- Regression equation of X on Y & Y on X

Text Books

- Gupta S.P., *Statistical Methods*, Sultan Chand, 2011.
- Gupta.S.C. and Kapoor.V.K, *Elements of Mathematical Statistics*, Sultan Chand & sons, 2008.

Reference Books

- Gupta.S.C. and Kapoor.V.K, *Fundamentals of Mathematical Statistics*, Sultan and Sons, 2007.
- Snedecor G.W and Cochran W.G., *Statistical Methods*, Oxford Press and IBH. 2006.
- Wayne W. Daniel- Bio statistics, Sareen printing press, Delhi, 2009.

UMAA205/UMAA303 STATISTICS-II

Semester	: III	Credit	: 5
Category	: Allied	Hours/week	: 4T+1P
Class & Major	: II B.A Corporate Economics	Total Hours	: 65

Objectives:

To enable the students

- Understand various Statistical measures applicable in Business and Economic analysis.
- Gain analyzing skill in the field in Business and Economic analysis.

UNIT- I DESIGN OF SAMPLING

(10) Hrs

Population and sample – Types of sampling – simple, stratified and systematic Sampling – Design of questionnaire – Sampling Design.

UNIT- II CORRELATION ANALYSIS

(12+3) Hrs

Karl Pearsons's Correlation co-efficient – Rank correlation Co-efficient.

UNIT- III REGRESSOPM ANALYSIS

(10+3) Hrs

Meaning – Regression lines – Regression equation and regression co-efficient.

UNIT- IV INDEX NUMBERS**(12+5) Hrs**

Meaning, uses – types of Index numbers – weighted and unweighted index numbers – Consumer price index numbers – Time reversal and factor reversal tests.

UNIT-V ANALYSIS OF TIME SERIES**(10) Hrs**

Time series – Components of Time series – Trend, seasonal variation, cyclical variation, irregular variation – methods of Secular Trend – Graphical method, semi average method, Moving Average method and method of Least squares – Measurement of seasonal variation – simple average method, ratio to moving average method – Uses of Time Series.

Text Book

- Gupta S.P., *Statistical Methods*, Sultan Chand & Sons, 2011.

Reference Books

- Agarwal B.L., *Basic Statistics*, New Age International Publishers, fourth edition 2006.
- Gupta. S.C. and Kapoor.V.K, “*Fundamentals of applied Statistics*,” Sultan and Sons, 2006.

PRACTICALS

- Karl Pearson’s correlation coefficient
- Spearman’s rank correlation
- Regression equation of X on Y
- Regression equation of Y on X
- Index numbers
- Moving average method.

UMAA409/UMAA301 BUSINESS STATISTICS

Semester	: III	Credit	: 4
Category	: Allied	Hours/week	: 4T+1P
Class & Major	: II BBA/ II B.Com / II B.Com- CA	Total Hours	: 65

Objectives:**To enable the students**

- Gain knowledge of the Statistical tools related to business problems.
- The concepts for analyzing business problems.

UNIT- I STAGES OF STATISTICAL SURVEY AND AVERAGES**(10+3) Hrs**

Introduction – Nature, Scope and limitations of Statistics in Business – Collection of data – Classification and tabulation of data – Diagrammatic and graphical representation of data – Measures of Central tendency – Mean, median, mode, Geometric mean, Harmonic mean, quartiles, deciles, percentiles

UNIT- II DISPERSION, SKEWNESS AND MOMENTS**(12+2) Hrs**

Measures of Dispersion – range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Lorenz curve-Skewness – Definition - Types of skewness – Absolute

and Relative measure of skewness - Karl Pearson's coefficient of skewness , Bowley's coefficient of skewness & Kelly's coefficient of skewness - Moments – measures of Skewness and Kurtosis based on moments

UNIT- III CORRELATION AND REGRESSION ANALYSIS (10+2) Hrs

Correlation Analysis – Types of Correlation – Methods of Measuring correlation – Karl Pearson's Coefficient of correlation – Spearman's rank correlation coefficient – Regression Analysis- regression lines – Regression equations

UNIT- IV INDEX NUMBERS (10+3) Hrs

Index numbers – unweighted index numbers – simple aggregate method – simple average of price relatives method- Weighted index number – weighted aggregate method – weighted average of price relatives method – Time reversal and factor reversal test - cost of living index number.

UNIT- V ANALYSIS OF TIME SERIES (10+3) Hrs

Time series – Components of Time series – Trend, seasonal variation, cyclical variation , irregular variation – methods of measuring trend – graphical method, semi average method, moving average method, method of least squares- methods of measuring seasonal variation- simple average method, ratio to moving average method.

Text Book

- Gupta S.P., *Statistical Methods*, Sultan Chand & Sons, 2006

Reference Books

- Agarwal B.L., *Basic Statistics*, New Age International Publishers, fourth edition 2006.
- Elhance D.N and Veena Elhance and Agarwal B.M. , *Fundamental of statistics Kitab Mahal* , 1999.
- Pillai R.S.N and Bagavathi., *Statistics*, S.Chand & Company 2006.

UMAA406 INTEGRAL CALCULUS, LAPLACE TRANSFORM AND ORDINARY DIFFERENTIAL EQUATIONS

Semester	: IV	Credits	: 4
Category	: Allied	Hours/week	: 5
Class & Major	: II B.Sc Chemistry	Total Hours	: 65

Objectives:

To enable the students

- Acquire knowledge in Mathematics
- Apply the techniques of various branches of Mathematics
- Apply the techniques in their respective major subjects.

UNIT-I INTEGRALS 15Hrs

Standard Integrals – Properties of definite integrals

UNIT-II INTEGRALS (CNTD) 15Hrs

Integration by parts – Double integrals – Applications of double integrals to find areas.

UNIT-III FOURIER SERIES 12Hrs

Fourier series for functions in $[0, 2\pi]$ and $[-\pi, \pi]$.

UNIT-IV LAPLACE TRANSFORM 10Hrs

Laplace transform of functions – Inverse Laplace transforms – Application of Laplace Transforms in solving differential equations.

UNIT-V DIFFERENTIAL EQUATIONS 13 Hrs

Formation of partial Differential Equation – Second order differential equations with Constant co-efficient – Homogeneous linear differential equations of the second order with variable co-efficients.

Text Book

- Manicakavachagam pillai, T.K., *Ancillary Mathematics Integral Calculus*, S.viswanathan Publishers & Printers Pvt.Ltd., Chennai, 2010.

Reference Books

- Narayanan and Manichavaschagam Pillay, *Ancillary Mathematics*, S.Viswanathan(Publishers & Printers) Pvt,Ltd., 2000.
- Grewal.B.S, Higher Engineering Mathematics, New Delhi, Khana Publishers, Khanna Publishers, 2002.

UMAA505/UMAA410 QUANTITATIVE TECHNIQUES FOR BUSINESS

Semester	: IV	Credits	: 4
Category	: Allied	Hours/Week	: 5
Class & Major	: III BBA	Total Hours	: 65

Objectives:

To enable the students

- Understand the various techniques of research.
- Solve real life problems in Business and Management.
- Enlighten on applications in management techniques.

UNIT-I LINEAR PROGRAMMING PROBLEM 15 Hrs

Mathematical Formulation of the Problem – Graphical Solution Method – Some Exceptional Cases – General Linear Programming Problem – The Computational Procedure – Use of Artificial Variable Techniques – Big- M Method. Simple problems.

UNIT-II TRANSPORTATION PROBLEM 15 Hrs

General Transportation Problem – The Transportation Table – Loops in Transportation Tables – Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution – Test for Optimality-Degeneracy in Transportation Problem – Transportation Algorithm (MODI Method). Simple problems.

UNIT-III ASSIGNMENT PROBLEM 12 Hrs

Mathematical Formulation of the problem – The Assignment method – Special Cases in Assignment Problem. Simple problems.

UNIT-IV GAME THEORY**10 Hrs**

Two-person Zero-sum Games – Some Basic Terms – The Maximin-Minimax Principle – Games Without Saddle Points – Mixed Strategies – Graphic Solution of $2 \times n$ and $m \times 2$ Games – Dominance Property Simple problems.

UNIT-V NETWORK SCHEDULING BY PERT/CPM**13 Hrs**

Network and Basic Components- Logical Sequencing- Rules of Network Construction- Critical Path Analysis- Probability Considerations in PERT- Distinction between PERT and CPM. Simple problems.

Text Book

- Kanti Swaroop, Gupta P.K. and Manmohan, “*Operation Research*”, Sultan Chand & Sons, Delhi, 2003.

Reference Books

- Kapoor .V.K, “*Introduction to Operation Research*” Sulthan Chand & Sons 1996.
- Sharma S.D, “*Operation Research*” Kedar Nath Ram Nath & Co 1995
- Taha.A Hamdy, “*Operation Research-An Introduction*”, Prentice hall of India pvt ltd, New Delhi, 6th edition, 2000.

UMAE302 NUMERICAL METHODS USING C++

Semester	: II	Credits	: 2
Category	: Non Major Elective	Hours/Week	: 4
Class & Major	: II UG	Total Hours	: 52

Objectives:**To enable the students**

- Understand the various tools in solving numerical problems.
- Apply these methods in a computer environment.

UNIT-I INTRODUCTION TO C++**10 Hrs**

Variables – Input and output – If statement – Logical operators – Nested If and Switch statements – For statement – While statement – Arrays – Pointers – Library functions – user defined function.

UNIT-II SYSTEM OF LINEAR EQUATIONS**10 Hrs**

Gauss – Elimination method – Pivoting – Gauss – Jordan Elimination method – Gauss – Seidal Iteration method

UNIT-III NON-LINEAR EQUATIONS AND INTERPOLATION**10 Hrs**

Bisection - method – Newton’s method – Interpolation – Newton’s divided difference formula – Lagrange’s interpolation – Newton’s forward and backward difference formula. (Application of C++ Programming is included for Units III & IV)

UNIT-IV NUMERICAL DIFFERENTIATION**10 Hrs**

Numerical Differentiation – Numerical Integration – Newton’s cotes method – Trapezoidal rule – Simpson’s rule.

UNIT-V NUMERICAL DIFFERENTIAL EQUATIONS**12 Hrs**

Initial value problem – Euler’s method – Runge – Kutta method – Boundary value problem.

Text Books

- James M.Ortega Andrew S.Grimshaw., An Introduction to c++ and Numerical Method, Oxford University Press, New York, 1999.
- Jain M.K, Iyengar S.R.K and Jain R.K.,Numerical Methods for Scientific and Engineering Computation, Wiley Eastern Ltd. New Delhi,1999.

Reference Books

- Balagurusamy E., Object Oriented Programming with C++, Tata McGraw Hill Publishing Company Ltd, New Delhi, 1996
- Froberg C.E, “Introduction to Numerical Analysis”, Addison-Wesely Publishing Company, 1972.

UMAE 402/UMAE306OPERATIONS RESEARCH FOR MANAGERS

Semester	: III	Credits	: 2
Category	: Non Major Elective	Hours/Week	: 4
Class & Major	: II UG	Total Hours	: 52

Objectives:**To enable the students**

- Understand the various techniques of research.
- Solve real life problems in Business and Management.
- Enlighten on applications in management techniques.

UNIT-I LINEAR PROGRAMMING PROBLEM**12 Hrs**

Mathematical Formulation of the Problem – Graphical Solution Method – General Linear Programming Problem – The Computational Procedure – Simple problems.

UNIT-II TRANSPORTATION PROBLEM**10 Hrs**

General Transportation Problem – The Transportation Table – Loops in Transportation Tables – Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution – Test for Optimality – Degeneracy in Transportation Problem – Transportation Algorithm(MODI Method). Simple problems.

UNIT-III ASSIGNMENT PROBLEM**10 Hrs**

Mathematical Formulation of the problem – The Assignment method – Special Cases in Assignment Problem. Simple problems.

UNIT-IV GAME THEORY**10 Hrs**

Two-person Zero-sum Games – Some Basic Terms – The Maximin - Minimax Principle – Games Without Saddle Points – Mixed Strategies- Graphic Solution of $2 \times n$ and $m \times 2$ Games- Dominance Property. Simple problems.

UNIT-V NETWORK SCHEDULING BY PERT/CPM**10Hrs**

Network and Basic Components – Logical Sequencing – Rules of Network Construction – Critical Path Analysis – Simple problems.

Text Book

- Kanti Swaroop, Gupta P.K. and Manmohan, “*Operation Research*”, Sultan Chand & Sons, Delhi, 2003.

Reference Books

- Kapoor .V.K, “*Introduction to Operation Research*” Sulthan Chand & Sons 1996.
- Sharma S.D, “*Operation Research*” Kedar Nath Ram Nath & Co 1995
- Taha.A Hamdy, “*Operation Research-An Introduction*”, Prentice hall of India pvt ltd, New Delhi, 6th edition, 2000.

UMAA501/UMAE305 STATISTICAL DATA ANALYSIS THROUGH SPSS

Semester	: III	Credits	: 2
Category	: Non Major Elective	Hours/Week	: 3T+1P
Class & Major	: II UG	Total Hours	: 52

Objectives:**To enable the students**

- Understand the techniques of statistical data analysis.
- Analyse data using various statistical techniques to evaluate research results through SPSS.

UNIT-I INTRODUCTION TO SPSS**(8+2)Hrs**

Essential terminology for all SPSS users – getting to SPSS for windows – the components of window – SPSS for windows screens – crucial preliminaries – entering data into SPSS – editing data – saving data file – retrieving data file.

UNIT-II ANALYSIS USING SPSS**(7+2)Hrs**

Merging data files – adding scores to existing cases – add variables – running a simple analysis and obtaining the output.

UNIT-III DIAGRAMS AND GRAPHS**(7+3)Hrs**

Checking the data – Box plots of score distributions – listing of the data using case summarizes – graphs – bar, line, pie chart, scatter plots and histograms.

UNIT - IV PARAMETRIC AND NON PARAMETRIC TEST**(9+3)Hrs**

Frequency distributions – measures of frequency distributions – cross tabulations –

obtaining two sample chi-square tests – log linear analysis – parametric statistical tests – comparing means – paired and unpaired t-test.

UNIT- V CORRELATION AND REGRESSION ANALYSIS (8+3)Hrs

Correlation and multiple regression – analyzing nominal and ordinal data – nonparametric analysis – Wilcoxon, Mann-Whitney and Kruskal Wallis tests – the concept of test reliability – assessing test reliability.

Text Book

- Rajathi.A and Chandran.P, SPSS for you, MJP Publishers, 2010.

Reference Books

- Clifford E. Lunenburg., “*Data analysis by resampling: concepts and applications*” Dusbury Thomson learning, Australia, (2000).
- Everitt, B.S and Dunn.G “*Applied multivariate data analysis*”. Amold London, (2001).
- Jeremy J. Foster., “*Data analysis using SPSS for windows.*”, New edition version 8-10, Sage publications, London, (2001).

PRACTICALS

- Entering data, labels, values.
- Presentation of data – Diagrams & Graphs
- Measures of location
- Measures of Dispersion
- Karl Pearson’s correlation coefficient
- Spearman’s rank correlation
- Regression equation of X on Y
- Regression equation of Y on X
- Cross tabulation
- Test for single mean
- Test for difference between two sample means – Independent samples
- Test for difference between two sample means – dependent samples
- Test for difference between two sample variances.

Non-parametric Test

- Chi- square test of goodness of fit.
- Chi-square test for independence of attributes.

UMAE 502/UMAE308 MATHEMATICS FOR COMPETITIVE EXAMS

Semester	: III	Credits	: 2
Category	: Non Major Elective	Hours/Week	: 4
Class & Major	: II UG	Total Hours	: 52

Objective:**To enable the students**

- Understand the concepts of Mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT-I PROBLEMS ON GENERAL ARITHMETIC**11 Hrs**

L.C.M & H.C.F of numbers – Their relations, Ratio and proportions – Inverse ratio – properties (Addendo, Subtrahendo, componendo & Dividendo) – ratio of four numbers – increasing and decreasing order of fractions – percentages – gain and loss percents – partnership problems.

UNIT-II TIME, DISTANCE AND WORK**11 Hrs**

Problems on speed, time, distance and work – application to train, boat, tank filling and direction problems and on completion of work.

UNIT-III SEQUENCES AND SERIES**10 Hrs**

General sequences and Series – A.P & G.P – n^{th} term – summation of series – determination of series in A.P & G.P.

UNIT- IV COMMERCIAL ARITHMETIC**10 Hrs**

Simple & compound interest – effective rate of interest – annuity – present value – future value – problems on R.D and installments.

UNIT-V LINEAR EQUATIONS, PERMUTATIONS AND COMBINATIONS**10 Hrs**

Formation and solution of linear equations with one variable – simultaneous equations with two and three variables – application to division of a number, problems on ages. Definitions of nPr , nCr – relationship between them – formulae – permutation with restrictions – circular permutations.

Text Books

- Abhigait Guha, "*Quantitative Aptitude for Competitive Examinations*", New Delhi, Tata McGraw Hill Pub., Co., Ltd. III Edn.
- Aggarwal R.S, "*Quantitative Aptitude*", 2008, New Delhi, S.Chand & Co.
- Edgar Thorpe, "*Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations*", New Delhi, Tata McGraw Hill Pub., Co., Ltd. III Edn.

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course code	Course Title	Component III	Component IV
III	Core VII	UMAM306	Differential Equation	Assignment	Problem Solving
	Core VIII	UMAM307	Introduction to Probability theory	Assignment	Problem Solving
IV	Core IX	UMAM405	Applications of Transforms	Model building	Assignment
	Core X	UMAM406	Mechanics	Model building	Problem Solving
	Core XI	UMAM404	Mathematical modeling	Assignment	Poster presentation

COURSE PROFILE M.Sc. (Mathematics)

Semester	Category	Course Code	Course Title	Contact Hrs/ Week	Credit	
					Min	Max
I	Core I	PMAM101	Modern Algebra	6	4	4
	Core II	PMAM102	Real Analysis	6	4	4
	Core III	PMAM103	Ordinary Differential Equations	6	4	4
	Core IV	PMAM 104	Graph Theory	6	4	4
	Non Major Elective			5	4	4
	Library / Seminar			1	-	-
TOTAL				30	20	20
II	Core V	PMAM201	Field Theory	5	4	4
	Core VI	PMAM202	Measure and Integration	5	4	4
	Core VII	PMAM206	Partial Differential Equations	5	4	4
	Core VIII	PMAM207	Classical Mechanics	5	4	4
	Core IX	PMAM208	Operations Research	5	4	4
	Non Major Elective			5	4	4
	Service Learning	PMAX201/ PMAX202	Mathematics for School Student/Elementary Mathematics(Service Learning)		1	1
TOTAL				30	25	25
III	Core X	PMAM305	Complex Analysis	5	4	4
	Core XI	PMAM310	Fluid Mechanics	6	4	4
	Core XII	PMAM311	Topology	6	4	4
	Core XIII	PMAM308	Number Theory and Cryptography	5	4	4
	Core XIV	PMAM309	Stochastic processes	4	3	3
	Core XIX	PMAP401	Project stage-I	2	-	-
	Value Education	PWSV301	Women's studies - I	2	1	1
TOTAL				30	20	20
IV	Core XV	PMAM405	Functional Analysis	6	5	5
	Core XVI	PMAM406	Mathematical Statistics	6	5	5
	Core XVII	PMAM403	Differential Geometry	6	5	5
	Core XVIII	PMAM407	Fuzzy Analysis	6	4	4
	Value Education	PWSV402	Women's studies - II	2	1	1
	Core XX	PMAP401	Final Project	4	5	5
TOTAL				30	25	25

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course code	Course Title	Hrs/ week	Credit	
					Min	Max
III	Self study paper	PMAS301/ PMAS302	Difference Equation Combinatorial Analysis	2	-	1

COURSES OFFERED TO OTHER DEPARTMENTS – PG

Semester	Category	Course Code	Course Title	Contact Hrs/ Week	Credit	
					Min	Max
I	Core III	PCAM103	Mathematical Foundations	4	3	3
		PCSM104	Theoretical foundations for computers	6	4	4
		PCAM504	Operations Research	4	4	4
	Non Major Elective	PMAE101	LaTeX and MATLAB	3	4	4
			LaTeX and MATLAB	2		
Non Major Elective	PMAE102	Operations Research	5	4	4	
II	Core VI	PCAM206	Applied Statistics	5	4	4
	Non Major Elective	PMAE202	NET/SET/ Competitive Exam	5	5	5
		PMAE203	Discrete mathematics	5	4	4

PMAM305 COMPLEX ANALYSIS

Semester	: III	Credits	: 2
Category	: Core X	Hours/Week	: 5
Class & Major	: II M.Sc Mathematics	Total Hours	: 65

Objectives:

To enable the students

- Lay the foundation for topics in Advanced Complex Analysis.
- Develop clear thinking and analyzing capacity for research.
- Introduce the fascinating world of complex variable theory which is markedly different from analyzing of real variable.

UNIT-I THE GENERAL FORM OF CAUCHY THEOREM 15 Hrs

Chains and cycles – Simple continuity – Homology – The General statement of Cauchy’s Theorem – Proof of Cauchy’s Theorem – Local exact differential – Multiply connected regions – Residue Theorem – The argument principle.

UNIT-II EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS 10 Hrs

Evaluation of definite integrals – Schwarz theorem – Weierstrass theorem – Taylor’s series – Laurent series.

UNIT-III PARTIAL FRACTION AND ENTIRE FUNCTIONS 15Hrs

Gamma Function_ Equicontinuity-Normality and compactness-Arzela’s theorem-Families of analytic function-The Classical definition.

UNIT-VI RIEMANN MAPPING THEOREM 15Hrs

Statement and Proof – Behavior at an angle Schwarz – Christoffel formula – Mapping on a rectangle – Functions with mean value property – Harnack;s principle.

UNIT-V ELLIPTIC FUNCTIONS 10 Hrs

Simply periodic functions-Doubly periodic functions.

Text Book

- Lars V. Ahlfors, *Complex Analysis* [3rd Edition], New York, McGraw Hill 1979.

Reference Books

- Conway J.B., *Functions of one complex variables*, Springer – Verlag, International student Edition, Naroser Publishing Co. 1978.
- Hille E., *Analytic Function Theory*[[2 vols], Gonm & Co, 1959
- Heins M., *Complex Function Theory*, New York ,Acamedic Press,1968.
- Presfly H.A., *Introduction to Complex Analysis*, Clarendon Press, Oxford, 1990.

PMAM310 FLUID DYNAMICS

Semester	: III	Credit	: 4
Category	: Core XI	Hours/Week	: 6
Class &Major	: II M.Sc Mathematics	Total Hours	: 78

Objectives:

To enable the students

- Understand incompressible and compressible fluid flows.
- Analyse fluid motion.

UNIT – I KINEMATICS OF FLUIDS IN MOTION 16 Hrs

Real Fluids and ideal fluids – Velocity of a fluid at a point –Streamlines and pathlines – Steady and unsteady Flows – The velocity potential, the vorticity vector – Local and particle rates of change – The equations of continuity – Conditions at a rigid boundary – General analysis of fluid motion

UNIT-II EQUATIONS OF MOTION OF A FLUID 14 Hrs

Pressure at a point in a fluid at rest – pressure at appoint in a moving fluid – conditions at a boundary of two inviscid immiscible fluids – Eluer’s equations of motion – bernoulli’s equation

UNIT-III THREE DIMENSIONAL FLOWS 14Hrs

Introduction- Sources sinks and doublets – Images in a rigid infinite plane – images in solid spheres – Axi- symmetric flows – strokes stream function –symmetric irrotational motions

UNIT-IV TWO DIMENSIONAL FLOWS 18 Hrs

Meaning of two dimensional flow – Use of cylindrical polar coordinates – The stream function – The complex potential for two – Dimensional , irrotational , incompressible flow – Complex velocity potentials for standards two dimensional flows- uniform stream – Line sources and line sinks – Line doublets – Line votices, Mline Thomson circle theorem –The theorem of blasius

UNIT-V VISCOUS FLOW 16 Hrs

Stress components in real fluid – relations between Cartesian components of stress – translational motion of fluid element – the rate of strain quadric and principal stresses – some

further properties of rate of strain quadric – stress analysis in fluid motion – the coefficient of viscosity and laminar flow – the navier – strokes equations of motion of a viscous fluid

Text Book

- Chorlton .F,” *Text book of Fluid Dynamics* “, CBS Publishers & Distributors, New Delhi, 2004.

Reference Books

- Batcherlor, C.K., “*An Introduction to fluid Mechanics*” , Cambridge University Press,2000
- Miline and Thomson L.M., “*Theoretical Hydrodynamics*”, 1962.

PMAM311 TOPOLOGY

Semester	: III	Credit	: 4
Category	: Core XII	Hours/Week	: 6
Class & Major	: II M.Sc Mathematics	Total Hours	: 78

Objectives:

To enable the students

- Understand topological spaces, continuous function, connectedness, countability and separation axioms.
- Distinguish Topological Spaces.
- Develop analytical thinking.

UNIT- I TOPOLOGICAL SPACES 16 Hrs

Topological spaces – Basis for a Topology – The order Topology – The product Topology on $X \times Y$ – The subspace Topology – Closed Sets and limit points.

UNIT-II CONTINUOUS FUNCTIONS 16 Hrs

Continuous functions – The product topology – The Metric Topology – The Metric Topology (Continued)

UNIT-III CONNECTEDNESS 16 Hrs

Connected spaces – Connected sets in the real line – Component and path components – Local Connectedness

UNIT-IV COMPACTNESS 15 Hrs

Compact spaces – Compact sets in the real line – Limit point Compactness – locally compactness.

UNIT-V COUNTABILITY AND SEPARATION AXIOMS 15 Hrs

The Count ability Axioms – The separation Axioms – Normal Spaces – The Urysohn Lemma – The Tietze Extension theorem –The Urysohn Metrization theorem.

Text Book

- Munkres R James, *A first course in Topology*, Delhi, Pearson Education Pvt.Ltd., 2002

Reference Books

- Dugunji.J., *Topology*, New Delhi, Prentice Hall of India, 1975
- George F. Simmons, *Introduction to Topology and Modern Analysis*, McGraw Hill Book Company. [Part One Chapters 1 to 7]

PMAM308 NUMBER THEORY AND CRYPTOGRAPHY

Semester	: III	Credit	: 4
Category	: Core XIII	Hours/Week	: 5
Class &Major	: II M.Sc Mathematics	Total Hours	: 65

Objectives:

To enable the students

- Understand the concepts of Number Theory and cryptography
- Apply the concepts of number theory in cryptography.

UNIT-I NUMBER THEORY

10 Hrs

Elementary Number Theory – Time Estimates for doing arithmetic – Divisibility and Euclidean algorithm – Congruences – Application to factoring.

UNIT-II CRYPTOSYSTEMS

15 Hrs

Introduction to Classical Crypto systems – Sum simple Crypto systems – Enciphering matrices DES.

UNIT-III FINITE FIELD

15 Hrs

Finite Fields and quadratic Residues – Reciprocity.

UNIT-IV CRYPTOGRAPHY

15 Hrs

Public Key Cryptography.

UNIT-V ELLIPTIC CURVES

10 Hrs

Primality, Factoring and Elliptic Curves.

Text Book

- Neal Koblitz, *A Course in Number Theory and Cryptography*, New York, Springer Verlag, 1987.

Reference Books

- Niven and Zuckermann, *An Introduction to Theory of Numbers*, New Delhi, [Edn.3], Wiley Eastern Ltd., 1976.
- David. M Burton, *Elementary Number Theory*, Iowa, Wm C.Brown Publishers, Dubuque, 1989.
- Ireland.K and M. Rosen, *A Classical Introduction to Modern Number Theory*, Springer – Verlag, 1972.

PMAM309 STOCHASTIC PROCESSES

Semester	: III	Credit	: 3
Category	: Core XIV	Hours/Week	: 4
Class &Major	: II M.Sc Mathematics	Total Hours	: 52

Objectives:

To enable the students

- Understand the concepts of Stochastic process.
- Analyse and apply the stochastic models for real life probabilistic situations

UNIT - I MARKOV AND STATIONARY PROCESSES 12Hrs

Specification of Stochastic Processes – Stationary Processes – Poisson Process – Generalizations – Birth and Death Processes – Markov Chain – Erlang Process

UNIT - II RENEWAL PROCESSES 10Hrs

Renewal processes in discrete and continuous time – Renewal equation – Stopping time – Wald's equation – Renewal theorems

UNIT - III MARKOV RENEWAL AND SEMI – MARKOV PROCESSES 10Hrs

Definition and preliminary results – Markov renewal equation – Limiting behavior – First passage time.

UNIT- IV BRANCHING PROCESSES 10Hrs

Generating functions of branching processes – Probability of extinction – Distribution of total number of progeny – Generalization of classical Galton – Watson process – Continuous time Markov branching process – Age dependent branching process – Bellman – Harris process

UNIT - V MARKOV PROCESSES WITH CONTINUOUS STATE SPACE 10Hrs

Brownian motion – Wiener process – Kolmogorov equations – First passage time distribution for Wiener process – Ornstein : Uhlenbeck process

Text Book

- Medhi. J, “*Stochastic Processes*”, New Age International (P) Ltd., New Delhi, 2nd Edition, 2001.

Reference Book

- Bhat. U.N, “*Elements of Applied Stochastic Processes*”, John Wiley and Sons Limited, 2nd Edition, 1984.
- Cox .D.R and Miller H.D, “*The theory of Stochastic Processes*”, Methuen, London, 1965.
- Ross .S. M, “*Stochastic Processes*”, Wiley, New York, 2nd Edition, 1996.
- Karlin .S and Taylor.H.M, “*A First Course in Stochastic Processes*”, 2nd Edition, Academic press, New York, 1975.

PMAM405 FUNCTIONAL ANALYSIS

Semester	: IV	Credit	: 5
Category	: CoreXV	Hours/Week	: 6
Class &Major	: II M.Sc Mathematics	Total Hours	: 78

Objectives:

To enable the students

- Understand Banach and Hilbert Spaces.
- Understand Operator theory leading to the spectral theory of Operators on a Hilbert space.

UNIT-I BANACH SPACES

16 Hrs

Definition –Some examples-Continous Linear Transformation –the Hahn-banach theorem-The natural embedding of N in N^{**} .

UNIT-II BANACH SPACES AND HILBERT SPACES

16 Hrs

Open Mapping Theorem-Conjugate of an operator-Definition and some simple properties-Orthogonal sets.

UNIT-III HILBERT SPACES

16 Hrs

Conjugate space H^* - Adjoint of operator – Self-adjoint operator – Normal and Unitary Operators – Projections.

UNIT-IV PRELIMINARIES ON BANACH ALGEBRAS

15 Hrs

Definition and some examples-Regular and single elements-Topological divisors of zero-Spectrum-The formula for the spectral radius-The radical and semi-simplicity.

UNIT-V STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS

15 Hrs

Gelfand Mapping-Application of the formula $r[x]=\lim \|x^n\|^{1/n}$ -Involutions on Banach Algebras-Gelfand-Neumark Theorem.

Text Book

- G.F.Simmons, “*Introduction to topology aand Modern Analysis*” McGraw Hill international Book Company,New York,1963.

Reference Books

- Bachman & L.Narici, “*Functional Analysis*”, Academic Press, New york, 1966.
- E.Kreyszig “*Introduction of Functionan Analysis with Applications*”, Johu Wiley & Sons, New York, 1978.
- Goffman. H.C., Fredrick, G., “*First course in Functional Analysis*”, Prentice Hall of India, New Delhi, 1987.
- W.Rudin, “*Functional Analysis*”, Tata McGraw Hill Book Company , New Delhi 1963.

PMAM406 MATHEMATICAL STATISTICS

Semester	: IV	Credit	: 5
Category	: Core XVI	Hours/Week	: 6
Class & Major	: II M.Sc Mathematics	Total Hours	: 78

Objectives:

To enable the students

- Understand axiomatic approach to probability theory to study some statistical characteristics, discrete and continuous functions and their properties.
- Understand sampling theory significance tests, estimation and testing of hypothesis.

UNIT-I CHARACTERISTIC FUNCTIONS 16 Hrs

Properties of characteristic functions – Characteristic functions and moments – Semi-invariants – Characteristic function of the sum of the independent random variables – Determination of distribution function by the characteristic function – characteristic function of multidimensional random vectors-Probability generating function.

UNIT- II SOME PROBABILITY DISTRIBUTIONS 16 Hrs

One point, two point, Binomial – Polya-Hypergeometric – Poisson(discrete) distributions – Uniform – normal gamma-Beta-Cauchy and Laplace (continuous) distribution.

UNIT-III LIMIT THEOREM 15 Hrs

Stochastic convergence – Bernoulli law of large numbers – Convergence of sequence of distribution functions – Levy-Cramer theorem-de-Moivre Lapalace theorem-Poisson, Chebyshev, Khintchine weak law of large numbers-Lindberg Theorem – Lyapunov Theorem – Borel-Cantelli Lemma – Kolmogorov Inequality and Kolmogorov Strong law of large numbers.

UNIT-IV SAMPLE MOMENTS AND THEIR FUNCTIONS 15 Hrs

Notion of a a sample and a statistic-Distribution functions of \bar{X}, S^2 and $[\bar{X}, S^2]$ - χ^2 distribution-Student t-Distribution-Fisher's Z=Distribution-Snedecor's F-distribution of sample mean from non-normal populations.

UNIT-V SIGNIFICANT TEST 15 Hrs

Concept of statistical test-Parametric tests for small and large samples- χ^2 test.Estimation: Preliminary notion-Consistency estimation-Unbiased estimates-Sufficiency-Efficiency-Asymptotically most efficient estimates-methods of finding intervals.

Text Book

- M.Fisz, “*Probability Theory and Mathematical Statistics*”, John Wilry and sons, New York,1963.

Reference Books

- K.L.Chun, “*A Course in Probability Academic Press*”, New York, 1974
- R.B.Ash, “*Real Analysis and Probability*”, Academic Press, New York, 1972
- R.Durrett, “*Probability Theory and Examples*”, (2nd Edition) Duxbury press.

- V.K.Rohatgi, “ *An Introduction to Probability Theory And Mathematical Statistics*”, (3rd Edition) Wiley Eastern LTd., New Delhi, 1983.

PMAM403 DIFFERENTIAL GEOMETRY

Semester	: IV	Credit	: 5
Category	: Core XVII	Hours/Week	: 6
Class &Major	: II M.Sc Mathematics	Total Hours	: 78

Objectives:

To enable the students

- Understand space curves and their intrinsic properties of a surface and geodesics further the non-intrinsic properties of surface and the differential geometry of surfaces are explored.
- Apply abstract algebra and analysis to geometrical problems and facts.

UNIT – I SPACE CURVES 16 Hrs

Definition of a space curve- Arc length – tangent – normal and binormal – curvature and torsion – contact between curves and surfaces – tangent surface – involutes and evolutes – Intrinsic equations – Fundamental Existence theorem for space curves – Helices.

UNIT – II INTRINSIC PROPERTIES OF A SURFACE 16 Hrs

Definition of a surface – curves on a surface – Surface of revolution – Helicoids – Metric – Direction coefficients – families of curves – Isometric correspondence – Intrinsic properties.

UNIT – III GEODESICS 16 Hrs

Geodesics – Canonical geodesic equations – Normal property of geodesics – Existence theorems – Geodesic parallels – Geodesics curvature – Gauss Bonnet theorem – Gaussian curvature – surface of constant curvature.

UNIT – IV NON INTRINSIC PROPERTIES OF A SURFACE 15 Hrs

The second fundamental form – Principal curvature – Lines of curvature – Developable – Developable associated with space curves and with curves on surface – Minimal surfaces – Ruled surfaces.

UNIT – V DIFFERENTIAL GEOMETRY OF SURFACES 15 Hrs

Fundamental Equations of Surface theory – Fundamental Existence theorem for surfaces- Compact surfaces whose points are umbilics – Hilbert’s lemma – Compact surface of constant curvature – Complete surfaces.

Text Book

- Willmore T.J., “*An Introuduction to Differential Geometry*”, Oxford University Press, (17th impression) New Delhi 2002

Reference Books

- Thorpe J.A. “*Elementary topics in Differential Geometry,*” Under graduate Texts in Mathematics, Springer – Verlag 1979.

- Kobayashi.S.and Nomizu.K. “*Foundations of Differential Geometry*”, Interscience Publishers, 1963
- Struik, D.T. “*Lectures on Classical Differential Geometry*”, Addison – Wesley, Mass.1950
- Wilhelm Klingenberg, “*A course in Differential Geometry*”, Graduate Texts in Mathematics, Springer – Verlag 1978.

PMAM407 FUZZY ANALYSIS

Semester	: IV	Credit	: 4
Category	: Core XVIII	Hours/Week	: 6
Class & Major	: II M.Sc. Mathematics	Total Hours	: 78

Objectives:

To enable the students

- Gain knowledge of fuzzy set, fuzzy subset and fuzzy logic.
- Distinguish fuzzy logic from classical logic.
- Apply fuzzy logic whenever uncertainty arises

UNIT-I FUZZY SETS 16 Hrs

Crisp sets – Fuzzy sets – Additional properties of Alpha cut – Representations of fuzzy sets – Extensions principle for fuzzy sets

UNIT-II OPERATIONS ON FUZZY SETS 16 Hrs

Types of operations – Fuzzy complements – Fuzzy intersections – Fuzzy unions – Combinations of operations – Aggregation operations.

UNIT-III ARITHMETIC 16 Hrs

Fuzzy numbers – Linguistic variables – Arithmetic operations on intervals – Arithmetic operations on fuzzy numbers – Lattice of fuzzy numbers – Fuzzy equations.

UNIT-IV FUZZY RELATIONS 16 Hrs

Crisp versus fuzzy relations – Binary fuzzy relations-binary relations on a single set – Fuzzy equivalence relations – sup-i-compositions of fuzzy relations-inf- ω_1 compositions of fuzzy relations

UNIT-V FUZZY LOGIC 14 Hrs

Classical logic-multi valued logics-fuzzy properties-fuzzy quantifiers.

Text Books

- George J.Klir and Bo Yuan, “*Fuzzy sets and Fuzzy logic-Theory and applications*” Prentice
- Timothy J.Ross, “*Fuzzy Logic with Engineering Applications*”, John Wiley & Sons Pvt. Ltd, The Atrium, Southern Gate Chichester, West Sussex PO198SQ, England, 2004.

Reference Books

- Kaufman.A, “*Introduction to the theory of Fuzzy subsets*”Volume - I, Academic Press, New York, 1975.
- Zimmermann.H.J, “*Fuzzy set theory and its Application*”, Allied Publishers, Chennai, 1996.

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	CoreXI	PMAM310	Fluid Mechanics	Poster presentation	Seminar
	CoreXII	PMAM311	Topology	Term Paper	Seminar
	CoreXIV	PMAM309	Stochastic Processes	Assignment	Seminar
IV	CoreXVIII	PMAM405	Fuzzy Analysis	Model building	Seminar

DEPARTMENT OF PHYSICS

Preamble

UG : Course Profile, list of courses offered to other departments and the syllabi of Courses offered in semesters III and IV along with evaluation components III & IV (with effect from 2015-2018 batch onwards)

PG : Course Profile, list of courses offered to other departments and the syllabi of courses offered in semesters III and IV along with evaluation components III & IV (with effect from 2015-2017 batch onwards) are presented in this booklet.

COURSE PROFILE: B.Sc. (Physics)

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit	
						Min	Max
I	I	Language	UTAL105, UTAL106/ UHIL101/ UFRL101	Basic Tamil-I/Advanced Tamil I/Hindi/French	4	2	3
	II	English	UENL107, UENL108	Basic English-I/Advanced English-I	5	3	4
	III	Core I	UPHM101	Fundamentals of Physics	2	1	1
	III	Core II	UPHM103	Mechanics	5	5	5
	III	Core III	UPHM104	Thermal and Statistical Physics	4	4	4
	III	Core Practical-I	UPHR101	Mechanics and Thermal Physics Practical's	3	2	2
	III	Allied	UMAA104	Algebra, Differential Calculus and Trigonometry	5	5	5
	IV	ValueEducation			2	1	1
TOTAL					30	23	25
II	I	Language	UTAL205, UTAL206 UHIL201/ UFRL201	Basic Tamil-II/Advanced Tamil-II/Hindi/French	4	2	3
	II	English	UENL207, UENL208	Basic English-II/Advanced English-II	5	3	4
	III	Core IV	UPHM202	Properties of Matter and Acoustics	3	3	3
	III	Core V	UIDM201	Material science	4	4	4
	III	Core Practical-II	UPHR202	Properties of Matter and Acoustics Practical's	3	2	2
	III	Allied	UMAA212	Integral Calculus, Laplace Transform and Ordinary Differential equation	5	5	5
	IV	NME	-	-	4	2	2
	IV	Soft Skill			2	1	1
	V	Extension Programme/ Physical Education/NCC	-	-	-	1	2
TOTAL					30	23	26

III	I	Language	UTAL305, UTAL306/ UHIL301/ UFRL301	Basic Tamil- III/Advanced Tamil- III/Hindi/ French	4	2	3
	II	English	UENL307, UENL308	Basic English- III/Advanced English-III	5	3	4
	III	Core VII	UPHM302	Optics and Laser Physics	6	5	5
	III	Core Practical-III	UPHR302	Optics and Laser Physics Practical	3	2	2
	III	Allied	UCSA304	Mathematical Programming using C	3	3	3
	III	Allied Practical	UCSR307	Mathematical Programming using C Lab	3	2	2
	IV	NME	-	-	4	2	2
	IV	Value Education	-	-	2	1	1
TOTAL					30	20	22
IV	I	Language	UTAL405, UTAL406/ UHIL401/ UFRL401	Basic Tamil- IV/Advanced Tamil- IV/Hindi/ French	4	2	3
	II	English	UENL407, UENL408	Basic English- IV/Advanced English-IV	5	3	4
	III	Core VIII	UPHM402	Electricity and Magnetism	4	4	4
	III	Core IX	UPHM405	Atomic and Molecular physics	6	5	5
	III	Core Practical-IV	UPHR404	Electricity and Magnetism Practical	3	3	3
	III	Allied	UCHA401/ UCHA402	Chemistry-II	3	3	3
	III	Allied Practical	UCHA402/ UCHR403	Volumetric and Organic Analysis-I	3	2	2
	IV	Soft Skill			2	1	1
V	Extension Programme/Physi cal Education			-	-	2	
TOTAL					30	23	27
V	III	Core XI	UPHM501	Quantum Mechanics and Relativity	6	5	5
	III	Core XII	UPHM505	Basic Electronics	7	5	5
	III	Core XIII	UPHM509	Mathematical physics	7	5	5
	III	Core Practical-V	UPHR501	Electronics Practical -I	3	3	3
	III	Allied Optional			5	4	4
IV	Value Education			2	1	1	
TOTAL					30	23	23
VI	III	Core XV	UPHM608	Solid State Physics	5	5	5
	III	Core XVI	UPHM609	Computational Physics	5	5	5
	III	Core XVII	UPHM607	Digital Electronics and Microprocessor	5	4	4
	III	Core XVIII	UPHM603	Nuclear Physics	5	5	5

	III	Core Practical VI	UPHR604	Electronics Practical II	3	3	3
	III	Core Elective	UPHO601/ UPHO602/ UPHO603	Nanophysics/ Astrophysics/Spintronics	5	4	4
	III	Viva Voce	UHSC601	Comprehensive Viva Voce	-	1	1
	IV	Soft Skill			2	1	1
	V	Extension Programme/ Physical Education			-	-	2
TOTAL					30	28	30
GRAND TOTAL					180	140	153

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course Code	Course Title	Hrs/week	Credit	
						Min	Max
V	III	Core XIV	UPHM508	Electrical Appliance (self-study) /Mini Project	-	-	1
II	III	Core VI	UPHI201	Summer Internship	-	-	1
IV	III	Core X	UPHI401	Summer Internship	-	-	1

LIST OF COURSES OFFERED TO OTHER DEPARTMENTS NON-MAJOR ELECTIVES

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit	
						Min	Max
II	IV	Non Major elective	UPHE202	Applied physics	4	2	2
			UPHE203	Biomedical instrumentation			
III	IV	Non Major Elective	UPHE304/ UPHE503	Telecommunication System	4	2	2
			UPHE303	Servicing and maintenance of home appliances			

ALLIED

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit	
						Min	Max
I	III	Allied	UPHA102	Allied Physics-I	3	3	3
II	III	Allied	UPHA203	Allied Physics-II	3	3	3
III	III	Allied	UPHA303	Digital Electronics	3	3	3
III	III	Allied	UPHR303	Digital Electronics Practical	3	2	2
IV	III	Allied	UPHA402	Electronics(For Mathematics major)	3	3	3
IV	III	Allied	UPHR402	Electronics(For Mathematics major) Practical	2	2	2

ALLIED OPTIONAL

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit	
						Min	Max
V	III	Allied Optional	UPHA501	Conservation of Energy	5	4	4
			UPHA502	Laser for medical diagnosis	5	4	4
			UPHA503	Fiber optic communication	5	4	4

INTERDISCIPLINARY

Semester	Part	Category	Course Code	Course Title	Hrs/week	Credit	
						Min	Max
VI	III	Core XVIII	UIDM601	Solid state chemistry	4	4	4

UPHM302 OPTICS AND LASER PHYSICS

Semester	: III		Credit	: 5
Category	: Core VII		Hrs/Week	: 6
Class & Major	: II B.Sc. physics		Total Hours	: 78

Objectives

- To understand the concepts of dispersion of light, interference, diffraction and polarization of light waves and their applications in day-to-day life
- To study the working principle of laser and to apply the knowledge to industry, engineering, medicine
- To study fibre optic communication and its applications in different fields

UNIT- I GEOMETRICAL OPTICS

15 Hrs

Fermat's principle - dispersion of light - dispersive power - Cauchy's formula - deviation without dispersion - dispersion without deviation - cardinal points of an optical system and their relationships, thick lens and combinations- aberrations - spherical aberration - methods of minimizing spherical aberrations - chromatic aberrations in lens - condition for achromatism of two thin lenses in contact and without contact – eyepieces – Huygen's and Ramsden's eyepieces with comparisons

UNIT- II INTERFERENCE

15 Hrs

Introduction - condition for sustained interference of light - Young's experiment – theory of interference fringes - Fresnel's biprism - experimental determination of ' λ ' of monochromatic light and thickness of sheet - colour of thin films – airwedge - experiment to measure the diameter of the wire - Newton's rings - determination of wavelength of sodium light by Newton's rings - determination of ' μ ' of liquid –Michelson's interferometer - theory – applications.

UNIT- III DIFFRACTION

14 Hrs

Introduction - Fresnel and Fraunhofer diffraction - construction of half-period zones - zone plate - principle – theory - diffraction at a circular aperture - Fraunhofer diffraction at a

single slit - plane transmission diffraction grating - dispersive power of a grating - determination of wavelength of light using transmission grating (normal incidence).

UNIT- IV POLARISATION

13 Hrs

Polarisation of light - Brewster's law - double refraction - Nicol prism - quarter wave plate - half wave plate - production and detection of plane, circularly and elliptically polarized light - optical activity -specific rotation - Laurent's half-shade polarimeter.

UNIT-V LASER AND OPTICAL FIBRE

16 Hrs

Laser

Introduction - characteristics of laser light- spontaneous and stimulated emission- population inversion-pumping - lasing action-level scheme- CO₂- laser – applicati

Optical Fibre

Introduction - modes of propagation of a light - acceptance angle - numerical aperture - types of optical fibres - optical sources and detectors - optical communication - optical fiber sensors - medical applications.

Text Books

- R. Murugesan , Kiruthiga Sivaprasath, *Optics and Spectroscopy*, S. Chand & Company Ltd, New Delhi ,7th revised edition 2010.
- Brijlal ,N. Subramaniam, *A Text Book of Optics* , S. Chand & Company Ltd, New Delhi,2008

Reference Books

- Halliday D. Resnick , Walker, *Fundamentals of Physics* , J 6th Edition, NY , Wiley 2006
- Ajoy Ghatak , *Optics* , Tata Mc Graw ,Hill Publishing Company , New Delhi 1993
- S.L.Kakani , K.C. Bhandari, *A Text Book of Optics* S. Chand & Company Ltd, New Delhi ,2002
- B.B. Laud, *Lasers and Non-Linear Optics*,, New Age International Publishers,2009
- A.K.Ghatak and K. Thyagarajan, *Lasers - Principles and Applications*, Tata- Mc-Graw Hill
- Subir Kumar Sarkar, *Optical Fibers and Fibre Optic Communication Systems*, S. Chand & Company Ltd, New Delhi,2004
- R. P. Feynman, R B Leighton and M Sands, *The Feynman Lectures on Physics*, Vols. I, II, and III Narosa, New Delhi, 1998.

UPHR302 OPTICS AND LASER PHYSICS PRACTICAL

Semester : III
Category : Core practical-III
Class & Major : II B.Sc. Physics

Credit : 2
Hours/Week : 3
Total hours : 39

Objectives:

To enable the students

- Gain the practical knowledge of optics
- Understand the concepts of optical devices and principles.

General Experiments

1. Focal length of lens –uv method, auxiliary method, μ of a lens.
2. Air wedge – thickness of a wire.
3. Newton’s ring – radius of curvature of convex lens.
4. Spectrometer –angle and ‘ μ ’ of a prism.
5. Spectrometer- Dispersive power of a prism.
6. Spectrometer-grating – λ of mercury light-normal incidence.
7. Spectrometer-Cauchy’s constant.
8. Spectrometer – i-d curve

Optional

1. Spectrometer- i-i’ curve.
2. Spectrometer-grating –‘ λ ’ of LASER light(gas)
3. Spectrometer – grating -‘ λ ’ of LASER light (solid state)
4. Planck’s constant- using LASER Light.
5. Laser Light –Numerical aperture (NA) of optical fiber.
6. Spectrometer-Auto collimated lens using LASER Light.

Text Books

- Srinivasan M.N.,Balasubramanian S., Ranganathan R., *The Text book of practical physics*,Sultan chand &sons, new delhi,2006
- Ouseph C.C.,Rangarajan G., *A text book of practical physics Part-I*,S.Viswanathan publisher,1990.

Reference Books

- S.LGupta and V. Kumar, *Practical Physics*, Pragathi Prakashan, 25th edition, 2002

UPHA303 DIGITAL ELECTRONICS

Semester	: III	Credit	: 3
Category	: Allied I	Hours/week	: 3
Class & major	: II B.sc Computer science	Total hours	: 39

Objectives:

To enable the students

- Enhance their knowledge in designing of basic gates
- Solve Boolean expressions
- Construct adder, subtractor, multiplexer and decoder
- Acquire knowledge on flip flops, registers, counters and their application

UNIT- I NUMBER SYSTEM

7 Hrs

Binary, octal, hexadecimal-inter conversion-gray code-excess3-code-ASCII code-basic gates-De-Morgan’s theorem-universal gates.

UNIT- II KARNAUGH MAP

8 Hrs

Laws of Boolean algebra-solving Boolean expressions- K-Map- minterms-SOP-K- Map simplification using minterm (2,3 and 4 variables)- POS- K-map simplification using maxterms (2,3 and 4 variables)- incomplete specified functions)

UNIT- III ADDER AND MULTIPLEXERS

6 Hrs

Half adder- full adder –half subtractor –full subtractor-decoder-BCD to seven segment decoder-encoder-decimal to BCD encoder-multiplexer- applications-de-multiplexer.

UNIT -IV REGISTERS

9 Hrs

RS Flip flop using NOR and NAND gates-clocked RS flip flop-D Flip flop-JK flip flop-master slave flip flop-registers-shift registers (right to left and left to right)-applications.

UNIT - V COUNTERS

9 Hrs

Counters –modulus of a counters-asynchronous counter (4 bits)-synchronous counters (3 bits)-BCD counters-D/A conversion-R-2R binary ladder method –A/D conversion –successive approximation.

Text Books

- Malvino and Leach,*digital principles and applications*, Tata Mc Hill, New Delhi, 2007.
- Vijayendran, S. Viswanathan, *Digital Fundamentals*, Printers and Publishers Pvt. Ltd., 2002
- Virendra Kumar, *Digital Electronics*, New Age International Publishers, 2000

Reference Books

- Avinash Kapoor, *Digital Electronics*, National Publishing House, New Delhi, 2008.
- Maheshwari, *Principles and Practice of Electronics*, National Publishing House, New Delhi, 2008.
- Morris Mano, *Digital Logic and Computer Design*, Pearson Education, 2008

UPHR303 DIGITAL ELECTRONICS PRACTICAL

Semester	: I	Credit	: 2
Category	: Allied practical I	Hours/week	: 3
Class & Major	: II B.Sc Computer Science	Total Hours	: 39

Objectives:

To enable the students

- Enhance their knowledge in the construction of basic logic gates.
- Solve Boolean expressions.
- Acquire knowledge on adder, subtractor, multiplexer and decoder.
- Construct flip flops and registers.

General Experiments

1. Basic logic gates (AND, OR, NOT) using Discrete components.
2. Simplification of Boolean expression using Karnaugh Map.
3. Verification of DeMorgan's Theorem and Boolean algebra.
4. NAND as Universal Gates.
5. Half Adder and Full Adder using NAND gates.
6. Half and Full subtractors using NAND gates.
7. Multiplexer and Demultiplexer.
8. RS, T Flip flops using NAND gates only.

Optional

1. Shift Register
2. NOR as Universal Gates

UPHE304/UPHE503 TELECOMMUNICATION SYSTEM

Semester	: III	Credit	: 2
Category	: Non major elective	Hours / week	: 4
Class & Major	: II UG	Total hours	: 52

Objectives:

To enable the students

- Understand the basic and advanced working principles of communication system.
- Analyse the signals used in mobile communication.
- Understand the basic charging problems and network troubleshoot.

UNIT- I RADIO TRANSMISSION SYSTEM 11 Hrs

Introduction –AM transmitter –FM transmitter –tuned RF receiver –AM broadcast receivers –FM super heterodyne receiver –measurement of receiver performance.

UNIT -II TELEVISION SYSTEMS 11 Hrs

Television basics –transmission –color television –color tv camera –color tv transmission – color television receiver –CCD camera –television transmitter –television screens –CRT And LCD.

UNIT -III FIBER OPTICS COMMUNICATION SYSTEMS 10 Hrs

Total internal reflection and basics of fiber optic system –optical fibers –types of optical fibers – optical propagation theory (based on ray optics) – conventional optical fiber –attenuation in optical fiber –fiber selection – fiber source – fiber fabrication –cabling –fiber connectors – applications – internet, medicine – fiber optics transmitters and receiver (block diagram only)

UNIT- IV MOBILE COMMUNICATION 10 Hrs

Introduction to mobile phones –generation of mobile phones –introduction to GSM/CDMA cellular technologies – working of GSM – information of cell sites and base station –call processing of a GSM – GPRS. Blue tooth - wifi – wimax –you tube – skype.

UNIT- V TROUBLE SHOOTING (Demonstration) 10 Hrs

SIM Card problems –charging problems – battery problems –software flashing – IMEI information. Downloads of logos and ring tones – problems related to mobile phone handsets – replacement of various components –ICS.

Text Books

- Anokhsingh, principles of communication engineering S.Chand and company Ltd1st edition reprint 2001.
- B.Kanickaraj, cell phone servicing SJC, 2000

Reference Books

- JK Franz &VK jain, *optical communication*, 1stedition, components and narosa publication house Pvt Ltd, reprint 2005.
- Ajoyghatak k Thyagarajan *Introduction to fiber optics* Cambridge university press reprint 2000.

UPHE303 SERVICING AND MAINTANCE OF HOME APPLIANCES

Semester	: III	Credit	: 2
Category	: Non major elective	Hours/Week	: 4
Class and Major	: II UG	Total hours	: 52

Objectives:

To enable the students

- Understand the principles and functions of basic circuit elements
- Service and maintain the home appliances

UNIT-I BASIC CIRCUIT ELEMENTS

9 Hrs

Resistor-capacitor-indicator-diodes-transistors-LED-LCD-LDR (principles and function)ac& ddc currents-generation and distribution of ac-transformer-measurement of ac-ammeter-voltmeter-multimeter-wattmeter

UNIT-II HOME APPLIANCES

12 Hrs

Incandescent lamp-mercury lamp-sodium vapour lamp-CFL lamp-fan-mixer-grinder-power supplier-inverters(UPS)(principles and functions only)-air conditioner-air cooler-refrigerator-washing machine-water heater-induction stove-electric cooker-microwave oven-(principle working and precaution)

UNIT-III ELECTRONIC DEVICES

9 Hrs

Speaker-loud speaker-mike-CD-DVD-VCD-TV-LCD TV-digital clock-digital watch-cell phone-internet modem (principles and functions only)

UNIT-IV SENSORS

7 Hrs

Sensors-heat and light sensors-remote sensors-smoke detectors-types of alarms-indicators LDR –gas sensor(principle and function)

UNIT-V PRACTICALS

15 Hrs

Servicing and maintenance- Mixer-grinder-Gas stove-Gas stove-Refrigerator-Air cooler-Air conditioner-Colour TV-DVD player-LDR

Text Book

- A.K.Maini, *Colour Television & Video Technology*, CSB publishers-2005

Reference Books

- B.L.Theraja, *A Text Book of Electrical Technology*, S.Chand and Company, New Delhi 2005
- J.B.Gupta, *Electrical Machines*, SK Kataria and sons, New Delhi. 2010

UPHM402 ELECTRICITY & MAGNETISM

Semester	: IV	Credit	: 4
Category	: Core VIII	Hours/week	: 4
Class & Major	: II B.Sc Physics	Total Hours	: 52

Objectives:

To enable the students

- Understand the meaning and use of electric field.
- Recognize the factors that determine the resistance of a conductor.
- Analyze the magnetic field associated with bar magnet, magnetic dipole.

UNIT- I ELECTROSTATICS

12 Hrs

Electrostatic potential- Electric potential as line integral of electric field - Relation between electric potential and electric field in vector form - Poisson's and Laplace's equations – Capacitance - Spherical and cylindrical capacitor- Energy of a charged capacitor - Energy density - Loss of energy due to sharing of charges. Electrometers - Kelvin's attracted disc electrometer.

UNIT - II CURRENT ELECTRICITY AND THERMO ELECTRICITY

10 Hrs

Carey Foster bridge - Theory - Determination of temperature coefficient of resistance. Calibration of ammeter and voltmeter using a potentiometer - Seebeck, Peltier and Thomson effects- Laws of thermoelectric circuits - Peltier coefficient- Thomson coefficient- Application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients - Thermoelectric diagrams and uses.

UNIT - III CHEMICAL EFFECTS AND MAGNETIC EFFECTS OF ELECTRIC CURRENT

10 Hrs

Electrical conductivity of an electrolyte - Faraday's laws of electrolysis - Determination of specific conductivity of an electrolyte (Kohlraush bridge) – Gibbs-Helmholtz equation for the emf of a reversible cell- Calculation of emf of a Daniel cell- Helmholtz Galvanometer - Theory of moving coil Ballistic Galvanometer- Damping correction- Absolute capacitance of a capacitor.

UNIT - IV ELECTROMAGNETIC INDUCTION AND TRANSIENT CURRENTS

10Hrs

Faraday's laws of electromagnetic induction in vector form- Determination of self-inductance by Anderson's bridge method and absolute mutual inductance by BG - Growth and decay of current in a circuit containing resistance and inductance. Growth and decay of charge in a circuit containing resistance and capacitor - Measurement of high resistance by leakage - Growth and decay of charge in a LCR circuit - Condition for the discharge to be oscillatory- Frequency of oscillation.AC generator two phase and three phase.

UNIT - V MAGNETIC PROPERTIES OF MATERIALS

10 Hrs

Susceptibility – Permeability - Intensity of magnetization and their relationship - Properties of dia, para and ferro magnetic materials- Langevin's theory of diamagnetism and paramagnetism- Weiss theory of ferromagnetism - Antiferromagnetism and ferrimagnetism.

Text Books

- R Murugesan , *Electricity and magnetism*, 8thedition, S Chand & Co, New Delhi,2006.
- M Narayanamurthy &N Nagarathnam, *Electricity & Magnetism*,6thedition, National Publishing Co, Meerut,2009.
- Brijlal N Subramanyan and Jivan Seshan,*Mechanics and Electrodynamics*, Eurasia Publishing House (Pvt.) Ltd, New Delhi, 2005.\

Reference Books

- Sehgal D L, Chopra K L, Sehgal N K , *Electricity and magnetism*, Sultan Chand & Sons, New Delhi,2007.
- David J Griffiths, *Introduction to Electrodynamics*, 3rd edition, Prentice Hall of India Pvt Ltd, New Delhi, 2007.
- K K Tewari, *Electricity & Magnetism*, S Chand & Co, 4th edition, 2005.

UPHR404 ELECTRICITY & MAGNETISM PRACTICAL

Semester	: IV	Credit	: 3
Category	: Core Practical IV	Hours/Week	: 3
Class & Major	: II B.Sc Physics	Total Hours	: 39

Objectives:

To enable the Students

- Apply the concepts of Electricity and Magnetism through direct experiment.
- Analyze the experimental errors on various techniques of electricity and magnetism.
- Operate these techniques to make error free measurement.

General Experiments

1. Calibration of Low range Voltmeter – Potentiometer
2. Calibration of High range Ammeter – Potentiometer
3. Field along axis of the coil – Vibration Magnetometer
4. Figure of a merit – Ballistic Galvanometer
5. Determination of m and B_H – TAN C position
6. Carey Foster’s Bridge – Resistance and Specific resistance
7. Deflection Magnetometer Using TAN A
8. Deflection Magnetometer Using TAN B

Optional

1. Calibration of High range Voltmeter – Potentiometer
2. Calibration of Low range Ammeter – Potentiometer
3. Absolute Determination of Mutual inductance – B.G
4. Carey Foster’s Bridge – Temperature Co-efficient
5. Absolute capacitance of a capacitor using Ballistic Galvanometer.
6. Comparison of mutual inductance – BG.
7. Self – inductance of a coil – Anderson’s Method

Text Book

- N.Srinivasan, S.Balasubramaniam & R.Ranganathan, *The text book of practical Physics*, Sultan Chand & Sons, 2006.

Reference Books

- A.Ponnusamy & B. Amalanathan, *Practical Physics*, Bright Publishers, 2000.
- C.C.Ouseph,G.Rangarajan, A text book of Practical physics Viswanatha Publishers, 2000.

UPHM405 ATOMIC AND MOLECULAR PHYSICS

Semester	: IV	Credit	: 5
Category	: Core IX	Hours/week	: 6
Class & Major	: II-B.Sc Physics	Total Hours	: 78

Objectives:

To enable the students

- Understand the fundamental properties of atom and atomic models.
- Solve the problems related to physics of materials on the atomic and molecular scales.
- Compare the spectrum of different atoms and their transitions.

UNIT - I BASIC PROPERTIES OF ATOMS

16 Hrs

Positive rays – Discovery – Properties – Positive ray analysis- Thompson parabola method – Determination of e/m- Determination of mass – Discovery of stable isotopes – Limitations – Dempster’s mass spectrograph- Aston’s mass spectrograph – Mass defect and packing fraction. Critical potentials- Methods of excitations of atoms – Experimental determination of critical potentials - Frank and Hertz’s experiment- Davis and Goucher’s method

UNIT-II THE PHOTOELECTRIC EFFECT

15 Hrs

Photoelectric emission – Laws-Lenard’s experiment-Richardson and Compton experiment-Einstein’s photoelectric equation-Experimental verification by Millikan’s experiment-photo electric cell.

UNIT- III ATOMIC MODELS

16 Hrs

The Bohratom Sommerfelds relativistic model – Vector atom model – Quantum numbers associated with vector atom model-Coupling schemes (LS, JJ coupling) Pauli’s exclusionprinciple – Periodic classification of elements.Magnetic dipole moment due to orbital motion of electron-Magnetic dipole moment due to spin- Stern and Gerlach experiment.

UNIT- IV ATOMIC STRUCTURE

16 Hrs

Optical spectra-Spectral terms and their notations - Fine structure of sodium D-lines – Alkali spectra-Spectrum of Helium- Zeeman effect-Experiment - Expression for the Zeeman shift-Larmor’s theorem- Quantum mechanical explanation for the normal Zeeman effect-Anomalous Zeeman effect-Paschen Back effect-Stark effect.

UNIT-V ATOMS AND ELECTROMAGNETIC RADIATION

15 Hrs

X- Rays – Production and detection of X-rays - Continuous and characteristic X-ray spectra - Moseley’s law- Absorption of X- rays by matter – Bragg’s law – The Bragg X-ray spectrometer - Compton effect – Change of wavelength – Experimental determination - Industrial and Medical application of X-rays.

Text Books

- R. Murugesan, *Modern physics* S.Chand & Co, 2008.
- J.B.Rajam, *Atomic Physics*, S. Chand & Co, 1986.
- Arthur Beiser, *Concept of Modern Physics*, Tata McGraw-Hill edition, 2006.

References Books

- N.Subramaniam and Brij Lal, *Atomic and Nuclear physics*, S.Chand, 2003.
- Gupta. A. B. and Dipak , *Atomic Physics*, Ghosh-Books & Allied publisher.
- Sehgal and Chopra, *Modern physics*, McGraw Hill Publication, 1996.

UPHA402 ELECTRONICS (FOR MATHEMATICS MAJOR)

Semester	: IV	Credit	: 3
Category	: Allied	Hours/week	: 3
Class &Major	: II-B.Sc. (Mathematics)	Total Hours	: 39

Objectives:

To enable the students

- Acquire knowledge about semiconductors, number system, and integrated circuits.
- Understand the characteristics and working of semiconductor devices.
- Know about basic logic gates and their constructions.

UNIT- I SEMICONDUCTOR DEVICES 11 Hrs

Semiconductor-types-intrinsic and extrinsic-p-type& n-type semiconductors-properties-pn junction diode- Zener diode characteristics-Zener diode as Voltage regulator.LED and its applications. Photodiode-Characteristics and application.

UNIT - II TRANSISTOR AND RECTIFIER 8 Hrs

Transistor -characteristics- common base – common emitter, common collector –RC coupled amplifier-filter circuit-half wave rectifier-full wave rectifier-Bridge rectifier- Photo transistor.

UNIT - III OPERATIONAL AMPLIFIERS 7 Hrs

Introduction – Characteristics of an ideal OP-AMP – CMRR– Inverting/Non-inverting Amplifiers - Adder, subtractor, differentiator and integrator.

UNIT- IV NUMBER SYSTEM 7 Hrs

Number system-analog to digital signals-digital circuit-Number system: binary number system-decimal to binary conversion-binary to decimal conversion-octal number system-hexadecimal number system

UNIT - V DIGITAL ELECTRONICS 6 Hrs

Logic gates -AND, OR, NOT gate construction using diodes and transistors- NAND and NOR gates – Universal building blocks.XOR gate- Boolean algebra – Demorgan’s theorem – verification -Basics of integrated circuit.

Text Books

- V.K. Metha, *Principle of Electronics*, S. Chand & Company Ltd., New Delhi. 2001
- R.S. Sedha, *A Text book of Applied Electronics*, S. Chand & Company Ltd., New Delhi, 2005.

Reference Books

- B.L. Theraja, *Basic Electronics*. S. Chand & Company Ltd., New Delhi, 2005.
- A. Gaykwad, *Operational Amplifiers and Linear Integrated circuits*, Printice Hall of India Pvt., Ltd., May 1995.

UPHR402 ELECTRONICS PRACTICAL (For Mathematics Major)

Semester	: IV	Credit	: 2
Category	: Allied Practical	Hours/week	: 2
Class & Major	: II-B.Sc. (Mathematics)	Total Hours	: 26

Objectives

To enable the students

- Practice the theoretical concepts of electronics through direct experiments
- Understand the significance of electronics in practical life

General Experiments

1. PN-junction diode characteristics
2. Zener diode-VI characteristics
3. Voltage Stabilization using Zener diode
4. Demorgan's theorem-Verification using gates
5. NAND and NOR as universal building block
6. OP-Amp as Adder and Subtractor
7. OP-Amp as Integrator and Differentiator
8. OP-Amp as Inverting and Non-inverting Amplifier

Optional

1. Half subtractor and full subtractor.
2. AND and OR gates using diodes.

Text Books

- N.Srinivasan, S. Balasubramanian & R. Ranganathan, *The text book of Practical Physics*, Sultan Chand & Sons, 2006.
- C.C. Ouseph, G. Ranagarajan, *A text book of Practical Physics*, S. Viswanathan Publisher Part I, 1990.

Reference Book

- Ponnusamy & B. Amalanathan, *Practical Physics*, Bright Publishers, 2002.

Evaluation: III and IV components of CIA

Semester	Category	Course Code	Course Title	Component-III	Component-IV
III	Core VII	UPHM302	Optics and Laser Physics	Simple optics experiment-Model display	Seminar-Recent trends in laser
	Non Major Elective	UPHE304/ UPHE503	Telecommunication Systems	Assignment	Seminar
		UPHE303	Servicing and maintenance of home appliances	Poster presentation	Simple experiment/Trouble shooting
IV	Core VIII	UPHM402	Electricity and Magnetism	Working model (Generation of electricity)	Usage of magnetic materials in day today life (Poster presentation)
	Core IX	UPHM405	Atomic and molecular physics	Non working model(atomic structure)	PPT(various spectroscopic techniques)
	Allied	UPHA303	Digital Electronics	Assignment (Problem Solving)	PPT
	Allied	UPHA402	Electronics (For Mathematics Major)	Assignment	Poster presentation

COURSE PROFILE: M.Sc. (Physics)

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit	
					Min	Max
I	Core I	PPHM101	Mathematical Physics –I	5	4	4
	Core II	PPHM102	Classical Mechanics	5	4	4
	Core III	PPHM103	Advanced Electronics	4	4	4
	Core IV	PPHM104	Electromagnetic Theory	5	4	4
	Core Practical	PPHR201	Physics practical –I	5	-	-
	Library			1	-	-
	NME			5	4	4
Total				30	20	20
II	Core V	PPHM201	Quantum Mechanics I	6	4	4
	Core VI	PPHM202	Statistical mechanics	5	4	4
	Core VII	PPHM203	Molecular Spectroscopy	5	4	5
	Core VIII	PPHM204	Advancein Material Science	3	2	2
	Core Practical I	PPHR201	Physics practical –I	5	5	5
	Core		Library	1	-	-
	Service learning	PPHX201	Electrical safety measures and energy harvesting	-	1	-
	NME		NET/SET/Competitive Exam	5	4	4
Total				30	24	25
III	Core IX	PPHM301	Quantum Mechanics II	6	5	5
	Core X	PPHM302	Solid State Physics I	5	5	5
	Core XI	PPHM303	Microprocessor and Microcontroller	5	4	4
	Core XII	PPHM304	Laser and nonlinear optics	4	3	3
	Project	PPHP401		2	-	-
	Core Practical-II	PPHR401	Physics practical –II	5	-	-
	Core		Library	1	-	-
	Value Education	PWSV301	Gender Studies	2	1	1
Total				30	18	18
IV	Core XIII	PPHM401	Mathematical Physics-II	5	5	5
	Core XIV	PPHM402	Nuclear and Particle Physics	4	4	4
	Core XV	PPHM403	Solid State Physics-II	5	5	5
	Core XVI	PPHM404	Crystal growth and Characterization	4	2	2
	Core Practical-II	PPHR401	Physics Practical-II	5	5	5
	Project	PPHP401		4	6	6
	Core		Library	1	-	-
	Value Education	PWSV402	Women’s Studies	2	1	1
TOTAL				30	28	28
GRANDTOTAL				120	90	90

PPHM301 QUANTUM MECHANICS II

Semester	: III	Credit	: 5
Category	: Core IX	Hours/Weeks	: 6
Class & Major	: II M.Sc Physics	Total Hours	: 78

Objectives:

To enable the students

- Understand the time perturbation effects in quantum mechanics.
- Examine the scattering and semi classical theory of quantum particles.
- Understand about Quantum field theory.

UNIT- I TIME DEPENDENT PERTURBATION THEORY 15 Hrs

Time Dependent Perturbation Theory-First and Second Order Transitions-Transition to Continuum of States-Fermi Golden Rule-Constant and Harmonic Perturbation- Collision-Adiabatic and Sudden Approximation- A Charged Particle in an Electromagnetic Field.

UNIT - II SCATTERING THEORY 16 Hrs

Scattering theory- Scattering of a particle by a fixed centre of force. Scattering amplitude differential and total cross sections. Method of partial waves. Phase shifts. Optical theorem. Scattering by a hard sphere and potential well. Integral equation for potential scattering. Green's function. Born approximation. Yukawa and Coulomb potential.

UNIT- III SEMI-CLASSICAL THEORY OF RADIATION 16 Hrs

Application of the time dependent perturbation theory to semi-classical theory of radiation –Einstein's coefficients –absorption -induced emission-spontaneous emission - Einstein's transition probabilities-dipole transition -selection rules –forbidden transitions.

UNIT- IV QUANTUM FIELD THEORY 16 Hrs

Quantization of Wave Fields- Classical Lagrangian Equation-Classical Hamiltonian Equation - Field Quantization of the Non-Relativistic Schrodinger Equation-Creation-Quantization of Electromagnetic Field Energy and Momentum.

UNIT- V GENERALISED ANGULAR MOMENTUM 15 Hrs

Infinitesimal rotation, Generator of rotation, Commutation rules, Matrix representation of angular momentum operators, Spin, Pauli spin matrices, Rotation of spin states, Coupling of two angular momentum operators, Clebsch Gordon co-efficients- Applications.

Text Books

- P.M.Mathew & K.Venkatesan, *Text Book of Quantum Mechanics* Tata McGraw Hill 2010.
- G Aruldas, *Quantum Mechanics*, Prentice Hall of India, 2006.
- David J.Griffith, *Introduction to Quantum Mechanics*, Pearson Prentice Hall, 2006.

Reference Books

- A Devanathan , *Quantum Mechanics*, Narosa Publishing-New Delhi, 2006.
- L.I Schiff , *Quantum Mechanics*, McGraw Hill, 1968.
- A.K. Ghatak and S. Loganathan , *Quantum Mechanics*, McMillan India,2006.
- R.Shankar, *Principles of Quantum Mechanics*, Springer, 2005.

PPHM302SOLID STATE PHYSICS -I

Semester	: III	Credit	: 5
Category	: Core X	Hours/Week	: 5
Class and Major	: II M.Sc Physics	Total Hours	: 65

Objectives:

To enable the students

- Understanding of the structural aspects and physical properties of condensed matter.
- Grade about nature of the materials.

UNIT- I CRYSTAL STRUCTURE 14 Hrs

Crystal classes and symmetry – 2D, 3D lattices — Ewald’s sphere construction – Bragg’s law – Systematic absences – Atomic scattering factor – Diffraction – Structure factor – Experimental techniques – Laue, Powder, Rotation methods – Phase problem – Electron density distribution (elementary ideas only).

UNIT – II LATTICE VIBRATION AND THERMAL PROPERTIES 12 Hrs

Dynamics of a chain of identical atoms-dynamics of a diatomic linear chain anharmonicity and thermal expansion-thermal conductivity-phonon-phonon interaction-normal and Umklapp processes heat capacity-density of phonon states—Dulong Pities’ law – Einstein specific heat- Debye’s model of specific heat.

UNIT -III ELECTRON THEORY OF METALS 13 Hrs

Electron moving in a one-dimensional well-density of states in three dimension-Fermi-Dirac statistics-effect of temperature on Fermi distribution function-electronic heat capacity-electrical resistivity-Ohm’s law-Widemann-Franz law-Hall effect.

UNIT –IV FREE ELECTRON THEORY 13 Hrs

Bloch’s theorem-Kronig-Penney model-construction of Brillouin zones-extended, reduced and periodic zone schemes-effective mass of an electron-nearly free electron model-conductors, semiconductors and insulator.

UNIT –V FERMI SURFACE 13 Hrs

Fermi surface and Brillouin zones-Harrison’s method of constructing Fermi surface in 2D electron, hole and open orbits-characteristics of Fermi surface-effects of electric field on the Fermi surface-effect of magnetic field on the Fermi surface-quantization of electron orbits-experimental study of Fermi surface.

Text Books

- M.A.Wahab *Solid state physics, Structure and properties of materials*, 2nd edition Narosa publishing house, 2005.
- Micea S Rogalski and Stuart B.Palmer *Solid state physics* Gordon and Breach science publishing, 2001.
- R.K.Puri and V.K.Babbar, *Solid state physics*, 3rd edition, S.Chand and company Ltd, 2005.
- P.K.Palanisamy *Solid state physics*, Scitech publications (India). Ltd , 2003.

Reference Books

- Charles Kittel, *Introduction to solid state physics*, Wiley eastern limited, 7th edition, 2008.

- Ajay Kumar Saxena, *Solid state physics*, MacMillan Publishers, 2006.
- J.S.Blackmore, *Solid state physics*, second edition-Cambridge university press, 1974.
- N.W.Ashcroft and N.D.Mermin, *Solid state physics*, CBS publishing Asia Ltd, 1988.
- V.Raghavan, *Material science*, Prentice Hall of India private Ltd, 1988.
- H.C.Gupta, *Solid state physics*, Vikas publishing house private Ltd, 1995.
- H.V.Keer, *Principles of solid state*, Wiley eastern Ltd, 1993.

PPHM303 MICROPROCESSOR AND MICROCONTROLLER

Semester	: III	Credit	: 4
Category	: Core XI	Hours/week	: 5
Class & Major	: II M.Sc. Physics	Total Hours	: 65

Objectives:

To enable the students

- Plan the internal organization of microprocessor and microcontroller.
- Design the microprocessor and microcontroller based systems.
- Apply the interfacing system in applications.

UNIT - I MICROPROCESSOR 8085 13 Hrs

Internal Architecture of 8085-Addressing Modes-Direct-Indirect-register addressing-register indirect addressing-Immediate addressing-Instruction Set-Programming techniques-interrupts of 8085.

UNIT - II PROGRAMMING WITH 8085 13 Hrs

Addition-Subtraction and Multiplication-square and square root-BCD to Binary Conversion-Binary to BCD conversion-Bubble Sort Method-largest and smallest-Ascending and Descending Order-Sum of Series-Time delay subroutine-Clock Program.

UNIT - III INTERFACING MEMORY AND PERIPHERALS 13 Hrs

Basic interfacing concepts-Peripheral I/O instructions-Device select and data transfer-I/O mapped I/O-Memory mapped I/O-Interfacing of ROM, RAM and EPROM Chips-Interfacing of 8255.

UNIT-IV INTERFACING APPLICATIONS 13 Hrs

Seven Segment Display Interface-Keyboard Interface-Interfacing to Digital to Analog Converter(DAC)-Analog to Digital Converter(DAC)-Stepper Motor Interface-Hardware Controlled Serial I/O using programmable chip 8251(USART).

UNIT-V MICROCONTROLLER 8051 ARCHITECTURE AND PROGRAMMING 13 Hrs

Architecture of 8051-Key features of 8051-Memory Organization-Program Memory (internal and external ROM) data memory-Internal RAM organization-special function registers-addressing modes-instruction set-data instructions-arithmetic instructions-logical instructions-Rotate and Swap operations-simple programs.

Text Books

- Ramesh Goankar-*Microprocessor Architecture programming and applications with the 8080A/8085*, Pen ram International Ltd, 2000.

- Douglas V.Hall-*Microprocessor Interfacing Programming and Hardware* 2nd edition Tata McGraw Hill Publishing Co.Ltd, 1991.

Reference Books

- Mohammed Rafiquzzaman-*Microprocessor and Microcomputer based system*, Universe Verlag Biefeld, 2002.
- Kenneth J.Ayala-*The 8051 Microcontroller Architecture, Programming and Applications*, edition 2 Penram International Ltd,2000.

PPHM304LASER AND NONLINEAR OPTICS

Semester	: III	Credit	: 3
Category	: Core XII	Hours/Weeks	: 4
Class & Major	: II M.Sc Physics	Total Hours	: 52

Objectives:

To enable the students

- Compare the different types of laser.
- Define the field of non linear optics.
- Study the working function of fiber optics.

UNIT - I LASERS

13 Hrs

Gas lasers – He-Ne, Ar⁺ ion lasers – Solid state lasers – Ruby – Nd: YAG, Ti Sapphire – Organic dye laser – Rhodamine – Semiconductor lasers – Diode laser, p-n-junction laser, GaAs Laser.

UNIT- II INTRODUCTION TO NONLINEAR OPTICS

10 Hrs

Refractive index – frequency dependent and intensity dependent refractive index - Wave propagation in an anisotropic crystal – Polarization response of materials to light – Second harmonic generation – Sum and difference frequency generation – Phase matching –four wave mixing - Third harmonic generation – self focusing – Parametric amplification - bistability

UNIT- III MULTIPHOTON PROCESSES

10 Hrs

Two photon process – Theory and experiment – Three photon process parametric generation of light – Oscillator – Amplifier – Stimulated Raman scattering – Intensity dependent refractive index optical Kerr effect – photorefractive, electron optic effects

UNIT- IVNONLINEAR OPTICAL MATERIALS

10 Hrs

Basic requirements – Inorganics – Borates (Sodium and potassium penta borates) – Organics – Urea, Nitro aniline – Semi organics – Thiourea complex – X-ray diffraction, FTIR and FT-NMR qualitative study – Kurtz test – Laser induced surface damage threshold

UNIT - VFIBER OPTICS

9 Hrs

Step – Graded index fibers – wave propagation – Fiber modes – Single and multimode fibres – Numerical aperture – Dispersion – Fiber bandwidth – Fiber loss – Attenuation coefficient – Material absorption

Text Books

- B.B. Laud-*Lasers and Nonlinear Optics*4th edition. New Age International (P) Ltd New Delhi 2010.

- Robert W. Boyd, *Nonlinear Optics*, 3rd edition Academic Press, New York, 2012.

Reference Books

- Govind P. Agarwal, *Fiber-Optics Communication Systems*, 3rd edition John Wiley & Sons, Singapore 2003.
- William T. Silvast, *Laser Fundamentals*, Cambridge University Press, Cambridge, 2013.
- D.L. Mills, *Nonlinear Optics – Basic Concepts*, Springer, Berlin, 2005.

PPHM401 MATHEMATICAL PHYSICS - II

Semester	: IV	Credit	: 5
Category	: Core XIII	Hours/Weeks	: 5
Class & Major	: II M.Sc. Physics	Total Hours	: 65

Objectives:

To enable the students

- Understand the various mathematical representations.
- Acquire knowledge about the tensor analysis.
- Formulate the Greens function and probability

UNIT - I PROBABILITY

13 Hrs

Probability - Addition rule of Probability - Multiplication Law of Probability - Probability Distributions - Binomial distribution - mean Binomial distribution - Standard deviation of binomial distribution - Poisson distribution - Normal distribution - characteristics of normal distribution - Applications of normal distribution.

UNIT - II APPLICATION IN MATRICES AND DETERMINANTS

13 Hrs

Properties of matrix addition and multiplication – different type of matrices and their properties – Rank of a Matrix and some of its theorems – Solution to linear homogeneous and non-homogeneous equations – Cramer’s rule – eigenvalues and eigenvectors of matrices – differentiation and integration of matrix.

UNIT - III ROLE OF GROUP THEORY IN PHYSICS

13 Hrs

Definition of Group – Subgroup invariant group abelian group orthogonal and unitary Groups - Homomorphism, isomorphism - Reducible and irreducible representations - generators of Continuous groups.

UNIT - IV TENSOR ANALYSIS

13 Hrs

Definition of Tensor – coordinate transformation - Summation convention - Contravariant, covariant and mixed tensors – rank of tensor – addition and subtraction of Tensors – Symmetry and antisymmetry Tensor – Contraction of tensor – product rule and Quotient rule - invariant tensors – Kronecker delta and Levi-Civita Symbol - irreducible tensors.

UNIT- V GREEN’S FUNCTIONS

13 Hrs

Green’s function - One dimensional Green function – boundary conditions – Eigen function - expansion of the Green’s function- Reciprocity theorem – Sturm Liouville type equations in one dimension and their Green’s functions.

Text Books

- Arfken & Weber, *Mathematical Methods for Physicists* - Elsevier 6th edition 2010.
- Parthasarathy H, *Topics in Mathematical Physics* - Ane Books Pvt. Ltd 2007.
- S.D. Joglekar, *Mathematical Physics* - Universities Press Pvt.Ltd. 1st edition 2005.
- Satyaprakash, *Mathematical Physics*, Sultan Chand & sons, New Delhi.

Reference Books

- H.K.Dass and R. Verma, *Mathematical Physics*, S. Chand & Company, 4th edition, 2011.
- Erwin Kreyszig, *Advanced Engineering mathematics*, Wiley Eastern, 10th edition, 2010.
- B.D. Gupta, *Mathematical Physics*, Vikas Publishing House Pvt.Ltd, 3rd edition, 2006.
- A.W.Joshi, *Elements of Group Theory of Physicists*, Wiley Eastern Ltd, 2010.

PPHM402 NUCLEAR AND PARTICLE PHYSICS

Semester	: IV	Credit	: 4
Category	: Core XIV	Hours/week	: 4
Class & Major	: II M.Sc. Physics	Total Hours	: 52

Objectives:

To enable the students

- Understand the nuclei model and its associated particles.
- Acquire the working process of nuclear reactor and detectors.
- Compare the different elementary particles

UNIT- I STATIC PROPERTIES OF NUCLEI AND NUCLEAR MODEL 10 Hrs

Nuclear size-determination from electron scattering-nuclear form factors-angular momentum-spin and moments of nuclei-nuclear model reactions-shell model-Nilsson model-physical concept of the unified model.

UNIT-II TWO NUCLEON SYSTEM AND NUCLEAR FORCES 12 Hrs

Dipole and quadrupole moments of the deuteron- central and tensor forces-evidence for saturation property-neutron-proton scattering-exchange character-spin dependence (ortho and para-hydrogen) –charge independence and charge symmetry. Iso spin formalism-general form of the nucleon-nucleon force-S-wave effective range theory-proton-proton scattering-evidence for hard core potential.

UNIT-III NUCLEAR DECAYS AND REACTIONS 10 Hrs

Electromagnetic decays: selection rules-Fermi theory of beta decay-kurie plot-Fermi and Gamow – teller transitions-parity violation in beta decay-introduction to nuclear reactions.

UNIT-IV NUCLEAR DETECTORS 10 Hrs

Interactions of radiations with matter-Ge and Si solid state detectors-colorimeter and the use for measuring gamma energies-synchrotron and Cerenkov counters-quantization ideas-hybrid detectors.

UNIT-V ELEMENTARY PARTICLES 10 Hrs

Relativistic kinematics-classification spin and parity determination of pions and strange particles –Gellmann nishijima scheme-properties of quark and their classification-elementary

ideas of $Su(2)$ and $Su(3)$ -symmetric groups and hadron classification-introduction to the standard model-electro weak interactions-W and Z Bosons.

Text Books

- Krane.K.S *Introducing nuclear physics*, Wiley India, 2008.
- Roy R Rand Nigam B.P *NuclearphysicsTheory and experiment*New Age International 2005.
- Tayal. D.C*Nuclear physics*Himalaya Publication 1997.
- Sathiya prakash Nuclear Physics Pragati Prakashan Publication 2011.

Reference Books

- D.Griffith, *Introduction to elementary particles* Academic press 2nd edition 2008.
- A.Nutshell by C.A.Bertulani *Nuclear physics*1st edition Princeton University press 2007.
- B.L.Cohen, *Concept of Nuclear physics*, McGraw-Hill, 2003.

PPHM403SOLID STATE PHYSICS -II

Semester	: IV	Credit	: 5
Category	: Core XV	Hours/week	: 5
Class & Major	: II - M.Sc Physics	Total Hours	: 65

Objective:

To enable the students

- Understand the concept of modern solid state physics.
- Develop the basic frameworks of solid state physics.
- Explore the theoretical understanding of various physical properties of condensed matter.

UNIT- I SEMI CONDUCTING PROPERTIES

14 Hrs

Carrier concentration in semiconductors-Fermi level-mobility of charge carriers-effect of temperature on mobility-electrical conductivity of semi conductors-Hall effect in semi conductors-junction properties: metal-metal junction, metal-semiconductor junction, semiconductor-semiconductor junction.

UNIT- II DIELECTRIC PROPERTIES

13Hrs

Dipole moment-polarisation-electric field of a dipole-polarisability-classical theory of electronic polarisation-polarisability, Dielectric constant and polarisability – Clausius Mossotti equation- piezo, pyro and ferroelectric properties of crystals-antiFerro electricity and ferric electricity

UNIT-III OPTICAL PROPERTIES

12 Hrs

Classical model drude model- optical refractive index and relative dielectric constant - colour centres (types and generation) – Luminescence-Photoconductivity

UNIT - IV MAGNETIC PROPERTIES

13 Hrs

classification of magnetic materials-atomic theory of magnetism-Langevin's classical theory of diamagnetism and para magnetism-quantum theory of magnetism ferromagnetism-Weiss molecular field theory-ferromagnetic domains-domain theory-anti ferromagnetism, ferrimagnetisms.

UNIT – V SUPERCONDUCTING PROPERTIES

13 Hrs

Sources of superconductivity-Meissner effect-thermodynamics of superconducting transition-isotope effect-London penetration depth-coherence length-band gap elements of BCS theory-flux quantisation-Josephson effect-High T_c superconductivity.

Text Books

- M.A.Wahab, *Solid state physics, Structure and properties of materials*, 2nd edition, Narosa publishing house, 2005.
- Micea S.Rogalski and Stuart.B.Palmer, *Solid state physics*, Gordon and Breach science publishing, 2001.
- R.K.Puri and V.K.Babbar, *Solid state physics*, third edition, S.Chand and company Ltd, 2005.
- P.K.Palanisamy, *Solid state physics*, Scitech publications (India). Ltd ,2003.

Reference Books

- Charles Kittel, *Introduction to solid state physics*, Wiley eastern limited, 7th edition 2000.
- Ajay Kumar Saxena, *Solid state physics*, MacMillan Publishers, 2006.
- J.S.Blackmore *Solid state physics*, second edition-Cambridge university press, 1974.
- N.W.Ashcroft and N.D.Mermin, *Solid state physics*, CBS publishing Asia Ltd, 1988.

PPHR401 PHYSICS PRACTICAL - II

Semester	: III&IV	Credit	: 5
Category	: Core practical-II	Hours/Week	: 5
Class and Major	: II M.Sc., Physics	Total Hours	: 65

Objectives:

To enable the students

- Program a microcontroller to perform various tasks.
- Design and implement microprocessor based embedded system.

MICROPROCESSOR AND MICROCONTROLLER

1. Selection of largest element of an array.
2. Selection of smallest element of an array.
3. Square of a single byte Hex number.
4. Square root.
5. Ascending order.
6. Descending order.
7. Arithmetic progression.
8. Clock program.
9. Code conversion.
10. ADC interface.
11. Interfacing of 8255.
12. Digital to Analog conversion.

13. Continuous Anticlockwise Rot-Stepper Motor.
14. Rotation through required angle.
15. Keyboard Interface.
16. Study of seven segment display.
17. Timer interface
18. Parallel interface
19. Microprocessor 8085 – solving equation.
20. Microprocessor 8085 – waveform generation

Optional

1. Temperature conversion- 8085.
2. Traffic control system using microprocessor.
3. Microprocessor 8085- Interface (A/D counter).

Text Books

- Ghosh P. K.Sridhar P. R., "*Introduction to Microprocessors for Engineers and Scientists*", Prentice- Hall of India, New Delhi, 2nd edition, 2001.
- Yu-Cheng Liu, Glenn A.Gibson, "*Microcomputer Systems: 8086/8088 Family*", Prentice-Hall of India, New Delhi, 2nd edition, 1994.
- Barry B.Brey, "*The Intel Microprocessors 8086/8088, 80186, 80286, 80386 and 80486*", Prentice-Hall of India, New Delhi, 3rd edition, 1995.
- Brian W. Kernighan, Dennis M. Ritchie, "*The C Programming Language*", Prentice-Hall of India, New Delhi, 2nd edition, 1993.

PPHM404 CRYSTAL GROWTH AND CHARACTERIZATION

Semester	: IV	Credit	: 2
Category	: Core XVI	Hours/week	: 4
Class and Major	: II M.Sc Physics	Total hours	: 52

Objectives:

To enable the students

- Interpret various techniques of crystal growth.
- Analyze the crystal growth techniques.
- Standardize the crystalline and its characterization.

UNIT - I NUCLEATION

10 Hrs

Nucleation concept – Kinds of nucleation – Classical theory of nucleation - Induction period – Measurement – Homogeneous Nucleation - Energy of formation of a critical spherical nucleus – critical radius – Nucleation rate.

UNIT - II CRYSTAL GROWTH FROM SOLUTION

11 Hrs

Low temperature solution growth – Solution and Solubility – Preparation of solution - Principle of low temperature solution growth - Mier's solubility diagram – Measurement of solubility – Achievement of super saturation.

Crystal Growth methods – Slow cooling method – Holden’s rotary crystallizer - Slow evaporation method – Johnson’s rotating crystal method - Temperature gradient method – Kruger and Fink U tube method.

UNIT - III MELT GROWTH

10 Hrs

Growth of crystal from melt – Bridgman method – Czochralski method – LEC growth of III – V materials - Verneuil method.

UNIT - IV GEL GROWTH

11 Hrs

Gel growth – Different gel medium – Specific gravity – Silica gel – Agar gel – Basic growth procedure – Single diffusion technique – Double diffusion technique – Reaction method – Chemical reduction method.

UNIT - V HYDROTHERMAL GROWTH AND FLUX GROWTH

10 Hrs

Crystal growth by hydrothermal method. High temperature solution growth (Flux growth) – Principle of flux growth – Slow cooling method – Slow evaporation method – Top seeded solution.

Text Books

- Mullin J.W, *Crystallization*, Butterworth, London, 1972.
- Brice J. C *Crystal Growth Processes*, John Wiley and Sons, New York (or) North Holland Publishing Co. Ltd, 1986.
- Brice. J.C. *The Growth of Crystals from Liquids*, Wiley, New York (or) North Holland Publishing Co. Ltd 1972 .
- SanthanaRaghavanP and RamasamyP *Crystal Growth Processes and Methods*, KRU Publications, 2000.

Reference Books

- C.Mahadevan, *Crystal Growth in Gel media*, Bulletin of IAPI, 1988.
- A.R. Patel and A.Venkateswara Rao, *Crystal Growth in Gel media*, Bulletin of Materials Science, 1982.
- A.T.Seshadri, V.K.Vijayaraghavan and G.Balakrishnan *A Versatile setup for determination of Dielectric Constant, Electrical Conductivity and Thermo electric power* Bulletin of IPAT, 1993.

Evaluation: III and IV components of CIA

Semester	Category	Course Code	Course Title	Component-III	Component-IV
III	Core IX	PPHM301	Quantum Mechanics -II	Problem solving	PPT
	Core X	PPHM302	Solid state physics –I	Assignment	Seminar
	Core XI	PPHM303	Microprocessor and microcontroller	Assignment	Programming
	Core -XII	PPHM304	Laser and nonlinear optics	Seminar	Working model of laser
IV	Core XIII	PPHM401	Mathematical Physics-II	Problem solving	Assignment
	Core XIV	PPHM402	Nuclear and particle physics	Assignment	PPT
	Core XV	PPHM403	Solid state physics -II	Journal review	Poster presentation
	Core XVI	PPHM404	Crystal growth and Characterization	Characterization Techniques analysis	Seminar

PPHX201 ELECTRICAL SAFETY MEASURES AND ENERGY HARVESTING

Semester	: II	Credits	: 1
Category	: Service Learning	Total Hours	: 40Hrs
Class & Major	: I M. Sc Physics		
Target Groups	: Villagers in the age group of 20-50 Yrs		

Objectives:

To enable the students

- Study the electric parameters and types of power generation.
- Understand the working of home appliances.
- Study the hazardous and precautions of electricity.

UNIT- I ELECTRICITY

8 Hrs

Basic components of Electricity - AC & DC Currents, High and Low Voltages, Resistance, Capacitance, Single & Three Phases, Power Factor, Types of Wiring.

UNIT- II ELECTRICITY IN HOME APPLIANCES

8 Hrs

Lighting Systems - Incandescent, Fluorescent bulbs and LED; Heating systems - Electrical water heaters, Iron boxes, Geysers; Mechanical systems – Grinders, Fans, Air Conditioners and Coolers, Dryers, Washing machine and Refrigerator; Electronics – Television, Radios, PC, Batteries.

UNIT-III HAZARDOUS OF ELECTRICITY

8 Hrs

Threats in high voltages – Electric shocks – Electrical fire accidents – Heat effects – Radiations from electronic home appliances and communication systems.

UNIT - IV PRECAUTIONS**8 Hrs**

Insulation based on Woods, Ceramics, PVC cables, Rubber insulation –General safety tools – Current and voltage measuring devices - First aid and medical rehabilitations – Tamil Nadu regulations on electrical safety measures.

UNIT -V ENERGY HARVESTING**8 Hrs**

Renewable and non- renewable energy sources - Solar energy, Wind mill, Bio gas and Bio mass Principle, operations and applications

Text Books

- B.Kanickairaj ,*Electrical Wiring* , SJC, 2011
- V.K.Jain and Amitabh bajaj, *Design of Electrical Installations*,Lakshmi Publication
- ltd,17th Edition, New Delhi, 2009.
- PhilSimmons and Ray C.Mullin,*ElectricalWiring Residential*, 17thEdition NewDelhi,2011

Reference books

- Herbert P. Richter, W. Creighton Schwan, *Electrical Wiring*, Park Publishing, 20th edition, 2008
- Ray C. Mullin & Robert L. Smith,*Electrical Wiring* , 14th edition, 2011
- J. Ray McReynolds, *Home Wiring*, Step By Step Guide Book Co, 1994
- Godfrey Boyle Renewable Energy: Power for a Sustainable Future,Oxford, 2012

DEPARTMENT OF COMPUTER SCIENCE

Preamble

UG : Course Profile, list of courses offered to other departments and the syllabi of courses in the first two semesters along with evaluation components III & IV (With effect from 2015-18 batch onwards), and

PG : Course Profile, list of courses offered to other departments and the syllabi of courses in the first two semesters along with evaluation components III & IV (With effect from 2015-17 batch onwards) are presented in the booklet.

COURSE PROFILE B.Sc. (Computer Science)

Semester	Part	Category	Course Code	Course Title	Contact Hrs/Week	Credit	
						Min	Max
I	I	Language	UTAL105 / UTAL106/ UHIL101 / UFRL101	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I /French-I	4	2	3
	II	English	UENL105 / UENL106	Basic English-I/ Advanced English-I	5	3	4
	III	Core Practical I	UCSR106	Computer Operations	2	1	1
	III	Core I	UCSM104 / UCAM105	Programming in C	5	4	4
	III	Core II	UCSM105	Information Technology	4	3	3
	III	Core Practical II	UCSR107 / UCAR103	Programming in C- Lab	3	3	3
	III	Allied I		Statistical Methods	5	4	4
	IV	Value Education			2	1	1
Total					30	21	23
II	I	Language	UTAL205/ UTAL206/ UHIL201/UFRL201	Basic Tamil-II/ Advanced Tamil-II/ Hindi-II/French-II	4	2	3
	II	English	UENL205/ UENL206	Basic English-II/ Advanced English-II	5	3	4
	III	Core III	UCSM205/ UCAM204	Data Structures and Algorithms	3	3	3
	III	Core IV	UCSM204/ UCAM203	Object Oriented Programming using C++	4	4	4
	III	Core Practical III	UCSR204/ UCAR203	Object Oriented Programming and Data Structures using C++ - Lab	3	3	3
	III	Allied II	UMAA210	Mathematics for Computer Science	5	4	4
	IV	Non Major Elective			4	2	2
	IV	Soft Skill			2	1	1
	V	Extension Programme / Physical Education			-	1	2
Total					30	23	26

III	I	Language	UTAL305/UTAL306 / UHIL301/UFRL301	Basic Tamil-III / Advanced Tamil-III/Hindi-III / French-III	4	2	3
	II	English	UENL305/ UENL306	Basic English-III / Advanced English-III	5	3	4
	III	Core V	UCSM304	Java Programming	5	4	4
	III	Core Practical IV	UCSR305	Java Programming-Lab	4	3	3
	III	Allied III	UPHA303	Digital Electronics	3	3	3
	III	Allied Practical	UPHR304	Digital Electronics – Practical	3	2	2
	IV	Non-Major Elective			4	2	2
	IV	Value Education			2	1	1
Total					30	20	22
IV	I	Language	UTAL405 / UTAL406 / UHIL401 / UFRL401	Tamil/Hindi/French	4	2	3
	II	English	UENL405 / UENL406	English	5	3	4
	III	Core VI	UCSM405 / UCAM405	Data Communication Network	4	3	3
	III	Core VII	UCSM406	Web programming	4	4	4
	III	Core VIII	UCSM407	Data Base Management System	5	4	4
	III	Core Practical V	UCSR409	Web Programming – Lab	3	3	3
	III	Core Practical VI	UCSR404	Data Base Management System – Lab	3	3	3
	IV	Soft skill			2	1	1
	V	Extension Programme / Physical Education			-	-	2
Total					30	23	27
V	III	Core IX	UCSM506	Operating System	6	5	5
	III	Core X	UCSM507/ UCAM504	Software Engineering	5	5	5
	III	Core XI	UCSM508/ UCAM509	Open Source Technology	5	5	5
	III	Core Practical VII	UCSR508	Operating System & OST – Lab	3	3	3
		Core Practical VIII	UCSR509	Web Application - Lab	4	4	4
	III	Allied Optional			5	4	4
	IV	Value Education			2	1	1
Total					30	27	27
VI	III	Core XII	UCSM608	Microprocessor and its Applications	5	4	4

	III	Core XIII	UCSM609	Distributed Technologies	5	4	4
	III	Core XIV	UCSM610	Multimedia and its Applications	4	4	4
	III	Core Practical IX	UCSR606	Distributed Technologies – Lab	4	3	3
	III	Core Project	UCSP601	Project	5	5	5
	III	Major-Elective	UCSO606/ UCSO607	Network Security / Mobile Technologies	5	4	4
	III	Viva – Voce	UCSC601	Comprehensive Viva Voce	-	1	1
	V	Extension Programme / Physical Education			-	-	2
	IV	Soft skill			2	1	1
Total					30	26	28
Grand Total					180	140	153

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Hrs/week	Credit	
					Min	Max
II	Core	UCSI201	Summer Internship / Working Model	-	-	1
IV	Core	UCSI401	Summer Internship	-	-	1

ALLIED COURSES OFFERED TO OTHER DEPARTMENTS

Class & Major	Semester	Category	Course Code	Course Title	Contact Hrs/Week	Credit
B.Com with Computer Applications	I	Allied	UCSA103	PC Software	3	3
	I	Allied Practical	UCSR108	PC Software – Lab	3	2
	II	Allied	UCSA203	Programming in C	3	3
	II	Allied Practical	UCSR205	Programming in C - Lab	3	2
	III	Allied	UCSA303	Multimedia	3	3
	III	Allied Practical	UCSR306	Multimedia – lab	3	2
	IV	Allied	UCSA403	Database Management System	3	3
	IV	Allied Practical	UCSR405	Database Management System - Lab	3	2
	V	Allied	UCSA508	Web Designing	3	3
	V	Allied Practical	UCSR506	Web Designing - Lab	3	2

BBA, B.Com and Economics	IV	Allied	UCSA405	Computer Applications in Business	3	3
	IV	Allied Practical	UCSR410	Computer Applications in Business – Lab	3	2
III BA Tamil	V	Allied	UCSA505	Tamil Kanini	3T + 2P	5
Maths	III	Allied	UCSA304	Mathematical Programming using C	3	3
	III	Allied Practical	UCSR307	Mathematical Programming using C – Lab	3	2
	V	Allied	UCSA507	Object Oriented Programming using Java	3	3
	V	Allied Practical	UCSR508	Object Oriented Programming using Java - Lab	3	2
Physics	III	Allied	UCSA304	Mathematical Programming using C	3	3
	III	Allied Practical	UCSR307	Mathematical Programming using C – Lab	3	2

ALLIED OPTIONAL

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit
V	III	Allied Optional	UCSA504	Digital Logic Fundamentals	3T+2P	5
			UCSA510	Web Programming	3T+2P	5

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit
II	IV	Non Major Elective	UCSE202	Office Automation	2T+2P	2
			UCSE204	Office Automation Tools	4P	2
			UCSE205	Multimedia Techniques	4P	2
III			UCSE302	Programming in C	2T+2P	2
UCSE304			HTML Programming	4P	2	
IV			UCSE402	Programming in C++	2T +2P	2
			UCSE403	Multimedia and its Applications	2T+2P	2
			UCSE404/ UCSE502	Visual Programming	2T +2P	2
			UCSE405/ UCSE503	Web Designing	2T+2P	2

UCSM304 JAVA PROGRAMMING

Semester : III
Category : Core V
Class & Major : II B.Sc Computer Science

Credit : 4
Hours/Week : 5
Total Hours : 65

Objectives:

To enable the students

- Understand the Concepts in Object Oriented Programming.
- Practice the Java Controls.
- Design and Build Java Application.

UNIT-I INTRODUCTION

10 Hrs

Fundamentals of Object Oriented Programming: Java Evolution – Overview of Java Language – Data Types, variables, arrays – Operators – Control statements - Introduction to classes – class fundamentals – Declaring objects – Constructors – Methods and Classes – Overloading methods – static - final - Nested and Inner classes.

UNIT - II EXCEPTION HANDLING AND FILES

13 Hrs

Exception handling – Types of Exception – try and catch – nested try – throw and throws – Multithreading Programming – I/O Streams – Reading and Writing files – Reading and writing Console I/O.

UNIT - III MULTITHREADED PROGRAMMING

12 Hrs

Java thread model- The main thread- Creating a thread- synchronization: using synchronized methods, the synchronized statement- Inter thread communication- suspending, Resuming and stopping thread- Multithreading client server application.

UNIT - IV STRING HANDLING AND AWT

15 Hrs

String Handling- String Operations: Comparison – Modifying String – String Buffer - AWT classes – Window fundamentals – Working with Frame windows, Graphics- AWT controls – Layout Managers.

UNIT - V APPLETS

15 Hrs

Applet Class – Applet Architecture – The HTML Applet Tag – Passing parameters in Applets – Applet Context – Improving the Banner Applet – get() Method - JDBC Concepts.

Text Book

- Herbert Schildt, *Java 2 Complete Reference*, Tata McGraw Hill, 7th Edition, 2008.

Reference Books

- E. Balagurusamy, *Programming with Java A Primer*, Tata McGraw Hill, Third Edition, 2007.
- Cay s. Horst Mann & Gary Cornell, *Core java*, Volume I (7th ed.), Sun Microsystems Press Java Series, 2006.

E-Resources

- <http://www.w3schools.com/html/>
- <https://www.youtube.com/watch?v=oqJy4e6Aa0M>
- <https://www.youtube.com/watch?v=7r3Vln4bGLk>
- <https://www.youtube.com/watch?v=n1cQPwZwTs4>

UCSR305 JAVA PROGRAMMING

Semester	: III	Credit	: 3
Category	: Core Practical IV	Hours/Week	: 4
Class & Major	: II B.Sc CS	Total Hours	: 52

Objectives:

To enable the students

- Write Java code in the form of both applications and applets.
- Implement Exception, threads and AWT controls.
- Creating files using I/O Packages

Lab Exercise

1. Simple Java Programs.
2. Simple programs using Classes and Objects
3. Constructors
4. Method Overloading
5. Method Overriding
6. Implementing Single and Multiple Inheritance concepts.
7. Implementing Thread Based Applications
8. Implementing Thread Synchronization
9. Implementing Exception Handling.
10. Implementing string manipulation using string and string buffer classes
11. Implementing Interfaces and Packages Concepts.
12. Implementing Graphics using Applet.
13. Sequential File Manipulations.
14. AWT controls
15. Layout Managers

UCSM405 / UCAM405 DATA COMMUNICATION NETWORKS

Semester : IV
Category : Core VI
Class : II B.Sc Computer Science

Credit : 4
Hours/week : 4
Total Hours : 52

Objectives:

To enable the students

- Identify the different types of network model.
- Apply Multiplexing techniques in the Telecommunication.
- Select appropriate routing algorithm.

UNIT - I INTRODUCTION

10 Hrs

Introduction to Data Communication, Network. Protocols & standards and standards organizations - Line Configuration - Topology - Transmission node - Classification of Network OSI Model - Layers of OSI Model.

UNIT -II TRANSMISSIONS

10 Hrs

Parallel and Serial Transmission -x.21 interface - Interface standards - Modems - Guided Media Unguided Media - Performance - Types of Error - Error Detection - Error Corrections.

UNIT - III MULTIPLEXING APPLICATIONS

10 Hrs

Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone systems project 802 - Ethernet - Token Bus - Token Ring FDD IEEE 802.6 - SMDS - Circuit Switching - Packet switching.

UNIT - IV LAYERS

12 Hrs

History of Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN X.25 Layers - Packet Layer Protocol - ATM - ATM Architecture - ATM Applications.

UNIT - V NETWORKS AND FRAME RELAY

10 Hrs

Repeaters –Bridges- Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP- SMTP - SNMP - World Wide Web- Frame relay- ATM- ATM LANs - X.25 - relay.

Texts Book

- B. Forouzan, *Introduction to Data Communications in Networking*, 5th Edition, TataMcGraw-Hill, New Delhi, 2008.

Reference Books

- S.Tanenbaum, *Computer Networks*, 4th Edition, Pearson Education, (Prentice hall of India Ltd), New Delhi, 2003.
- William Stallings, *Data and Computer Communication*, 5th Edition, Prentice Hall of India, 2007.

E-Resources

- <http://www.w3schools.com/html/>
- <http://accessengineeringlibrary.com/browse/data-communications-and-networking-fourth-edition>
- <http://www.mhhe.com/engcs/compsci/forouzan/frontmatter.pdf>

UCSM406 WEB PROGRAMMING

Semester : IV
Category : Core VII
Class & Major : II B.Sc Computer Science

Credit : 4
Hours / Week : 4
Total Hours : 52

Objectives:

To enable the students

- Understand the Concepts of Tags & Scripts.
- Apply scripts in both Client and Server side.
- Apply the Client and Server Side Scripting.

UNIT - I HTML AND JAVA SCRIPT

10 Hrs

World Wide Web – XHTML - Cascading Style Sheet - JavaScript – Java script objects - Date – Array – pattern matching using regular expressions – Dynamic documents with Java script.

UNIT - II XML TECHNOLOGIES

10 Hrs

Introduction-syntax-document structure-Document type definition-namespace - XML schemes Displaying raw xml documents-displaying xml documents with CSS-XSLT style sheets-XML processors - web services.

UNIT - III PHP

11 Hrs

Introduction- Mixing HTML and PHP-variables- statements -operators-conditional statements-if-switch-nesting conditions-merging forms with conditional statements-loops-while-do-for – loop iteration with break and continue.

UNIT - IV MySQL

10 Hrs

Creating MySQL database-Accessing the database in PHP: Connecting to the database server-Connecting to database-Reading the table and displaying the table data-Closing the connection- Updating the database-sorting data.

UNIT - V AJAX

11 Hrs

XML HTTP request objects- opening the XML HTTP request objects- Handling the downloaded data-Ajax with PHP-Passing data to the server with GET- passing data to the server with POST- Handling XML with PHP.

Text Books

- Robert W. Sebesta, *Programming with World Wide Web*, 4th Edition, Pearson Education, 2008.
- Steven Holzner, *The Complete reference PHP*, Tata McGraw-Hill Edition, 2008.

Reference Books

- I.Bayross, *Web Enable Commercial Application Development using HTML, DHTML, Java Script, Perl CGI*, Fourth Revision edition, BPB Publications, New Delhi, 2004.
- J.Jaworshi, *Mastering JavaScript*, BPB Publications, New Delhi, 2001.
- VikramVaswani, *PHP and MySQL*, Tata McGraw-Hill, 2005.

E-Resources

- <http://downloads.mysql.com/docs/apis-php-en.pdf>
- <ftp://ik.su.lt/PHP/McGraw.Hill.Osborne.Media.PHP.A.BEGINNERS.GUIDE.Oct.2008.eBook-DDU.pdf>

UCSR409 WEB PROGRAMMING LAB

Semester	: IV	Credits	: 3
Category	: Core Practical V	Hours/Week	: 3
Class & Major	: II B.Sc Computer Science	Total/Hours	: 39

Objectives:

To enable the students

- Acquire knowledge about Scripting.
- Apply conditional and looping statements in PHP.
- Develop web page using PHP and MySQL.

Lab Exercise

1. Creating simple webpage using PHP
2. Use of conditional statements in PHP
3. Use of looping statements in PHP
4. Creating user defined functions
5. File manipulation using PHP
6. Creating simple applications using PHP
7. Creating simple table with constraints
8. Insertion, Updating and Deletion of rows in MYSQL tables
9. Searching and Sorting of data by different criteria,
10. Working with string, numeric and date functions
11. Database connectivity in PHP with MySQL
12. Validating Input and Formatting the Output.

UCSM407 DATABASE MANAGEMENT SYSTEMS

Semester	: IV	Credit	: 4
Category	: Core VIII	Hours/week	: 4
Class	: II B.Sc Computer Science	Total Hours	: 52

Objectives:

To enable the students

- Acquire knowledge on Structure Query Language.
- Analyse the database using the Normal Forms.
- Design a database using SQL Commands.

UNIT-I INTRODUCTION

8 Hrs

Purpose of Database - Overall System Structure - Entity Relationship Model -Mapping Constraints - Keys - E-R Diagrams.

UNIT-II STRUCTURE OF DBMS

9 Hrs

Relational Model - Structure - Formal Query Language - Relational Algebra - Tuple and Domain Relational Calculus.

UNIT - III SQL

10 Hrs

Structured Query Language - Basic Structure - Set Operations - Aggregate Functions - Date, Numeric, and Character Functions - Nested Sub queries -Modification of Databases – Joined Relations-DDL - Embedded SQL.

UNIT - IV NORMAL FORMS

12 Hrs

Relational Database Design - Pitfalls - Normalization Using Functional Dependencies - First Normal Form-Second Normal Form-Third Normal Form-Fourth Normal Form And BCNF.

UNIT-V ORACLE

13 Hrs

Oracle - Introduction – SQL (DDL,DML, DCL Commands) – Integrity Constraints – PL/SQL – PL/SQL Block – procedure, function – Cursor management – Triggers – Exception Handling.

Text Book

- Silberschatz, Korth and Sudarshan, *Database System Concepts*, 6th Edition, McGraw Hill, New Delhi, 2010

Reference Books

- Raghu Ramakrishnan, *Database Management System*, 3rd Edition, Tata McGraw-Hill Publishing Company, New Delhi, 2012.
- Elmasri, Navathe, Somayajulu, Gupta, *Fundamentals of Database Systems*, 5th Edition, Pearson Education, New Delhi, 2008.

E-Resources

- <http://www.w3schools.com/html/>
- <http://codex.cs.yale.edu/avi/db-book/db6/slide-dir/>
- <http://engineerportal.blogspot.in/2013/09/database-system-concepts-6th-edition.html>

UCSR404 DATABASE MANAGEMENT SYSTEMS – LAB

Semester : IV
Category : Core Practical V

Credit : 3
Hours/week : 3
Total Hours : 39

Objectives:

To enable the students

- Develop practical skills on DBMS.
- Design the database using Oracle
- Select the techniques to access the database.

Lab exercise

39 Hrs

1. Create a Student_Information and Mark_Details data bases using DDL, DML, TCL and DCL.
2. Create a Library data base and perform the Aggregate Function & SET Operations.
3. Create a Hospital data base and perform the Inner and Outer Joins Operations.
4. Create Bank database and query it using group by having and order by.
5. Create Employee database and query it using sub queries.
6. Create Views and indexes for the Phone Directory database.
7. Create PL/SQL Block for Mark sheet processing.
8. Create the Procedures for Stock management data base.
9. Create the Functions for Real estate data base.
10. Create different types of triggers for Event Management database.

Note: All the tables should be created with Constraints.

UCSA303 MULTIMEDIA

Semester : III
Category : Allied

Credit : 3
Hours/week : 3
Total Hours : 39

Objectives:

To enable the students

- Grasp the concepts in Multimedia
- Apply Multimedia concepts in Photoshop and Flash
- Develop multimedia applications with their creative ideas.

UNIT - I INTRODUCTION

7 Hrs

Definition - Classification - Multimedia application - Multimedia Hardware - Multimedia software - CDROM - DVD.

UNIT - II MULTIMEDIA AUDIO

8 Hrs

Digital medium - sound cards - recording - editing - MIDI fundamentals - Working with MIDI.

UNIT - III MULTIMEDIA TEXT AND GRAPHICS

8 Hrs

Text in Multimedia - Multimedia graphics: coloring - digital imaging fundamentals - development and editing.

UNIT - IV MULTIMEDIA ANIMATION AND VIDEO

8 Hrs

Computer animation fundamentals - animation s/w tools and techniques. Multimedia Video: How video works – video shooting – video capture process.

UNIT - V MULTIMEDIA- PROJECT

8 Hrs

Stages of Project - Design Concept - Authoring - Planning and Costing – Multimedia Team.

Text Books

- S.Gokul, *Multimedia Magic*, Second edition, BPS Publication, New Delhi, 2008.
- Tay Vaughan, *Multimedia: Making it Work*, 9th Edition, Tata McGraw Hill New Delhi, 2010.

Reference Books

- Ben Willmore and Dan Ablan, *Adobe Photoshop CS4 Studio Techniques*, 2nd reprint Peachpit Publishers, New Delhi, 2009.
- Nick vandome, *photoshop elements 9, jumpstart*, McGraw Hill Edition, New Delhi, 2011.

E-Resources

- <http://books.rediff.com/book/multimedia-magic/9788183330695>
- <https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwifpaWT74>

UCSR306 MULTIMEDIA - LAB

Semester : III
Category : Allied

Credit : 3
Hours/week : 3
Total Hours : 39

Objectives:

To enable the students

- Understand the basic concepts in Multimedia.
- Design Multimedia projects in Photoshop and Flash.
- Develop multimedia in real time applications.

Lab Exercise

1. Photo Effects: image, Changing cloth texture and pattern, Changing background
2. Create a Brick wall texture using Photoshop
3. Photo Retouching: Color Correction, Blending image
4. Smooth skin effect
5. Adding blur effect to background
6. Create digital banner using text
7. Bouncing a ball in flash
8. Create torn paper edge effect
9. Create a Masking effect in Flash.
10. Create a banner using flash.

UCSA403 DATABASE MANAGEMENT SYSTEM

Semester	: IV	Credits	: 3
Category	: Allied	Hours/week	: 3
Class & Major	: II UG	Total Hours	: 39

Objectives:

To enable the students

- Understand the concepts of DBMS.
- Design the ER diagram for database.
- Create database using SQL queries and normal forms.

UNIT - I INTRODUCTION **8 Hrs**

Purpose of database system – data models – database languages – Transaction management – Storage management – DBA – database users – system structure.

UNIT - II RELATIONAL DATABASES **7 Hrs**

Structure – Fundamental and Additional Relational Algebra operations – Tuple Relational Calculus – Domain Relational Calculus.

UNIT - III DATABASE DESIGN AND ER MODEL **8 Hrs**

Overview of design process – Entity relationship model – Mapping Cardinalities – ER Diagrams - Extended ER Features.

UNIT - IV RELATIONAL DATABASE DESIGN **7 Hrs**

Features of good relational designs — decomposition using functional dependencies — Functional Dependencies – Normal forms based on primary keys – second & third Normal forms – Boyce-codd Normal Form – Properties of Relational Decompositions – Multivalued Dependencies & Fourth Normal Form – Join Dependencies & Fifth Normal Form.

UNIT -V SQLAND ORACLE **9 Hrs**

Basic Structure of SQL Queries – Set operations – Aggregate functions – Null values-nested sub queries – Complex Queries – Views – Modification of Databases- Joined Relations. Advanced SQL: Embedded SQL – Dynamic SQL-Oracle - Introduction - SQL (DDL,DML, DCL Commands) - Integrity Constraints - PL/SQL - PL/SQL Block - procedure, function - Cursor management - Triggers - Exception Handling.

Text Book

- Abraham Silberchatz, Henry F. Korth, S. Sudharshan, *Database System Concepts*, Fifth Edition, McGraw Hill, New Delhi,2005.

Reference Book

- Elmasri, Navathe, Somayajulu, Gupta, *Fundamentals of Database Systems*, Fourth Edition, Pearson Education, New Delhi,2008.

E-Resources

- <http://www.w3schools.com/html/>
- <http://codex.cs.yale.edu/avi/db-book/db6/slide-dir/>
- <http://engineerportal.blogspot.in/2013/09/database-system-concepts-6th-edition.html>

UCSR405 DATABASE MANAGEMENT SYSTEM - LAB

Semester : IV
Category : Allied Practical
Class &Major : II UG

Credits : 2
Hours/week : 3
Total Hours : 39

Objectives:

To enable the students

- Develop practical skills on DBMS.
- Design the database using Oracle.
- Select the techniques to access the database.

Lab Exercise

1. Create a table Student-master with the following fields client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.
 - a) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
 - b) Insert data into client_master
 - c) Insert data into supplier_master from client_master.
 - d) Delete the selected row in the client_master.
2. Create a table sales order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date, order status.
 - a) Add a new column for storing salesman number using ALTER Command
 - b) Set the s_order_no as foreign key as column constraints.
 - c) Set the s_order_no as foreign key as table constraints.
 - d) Enforce the integrity rules using CHECK.
3. Create a table student master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
 - a) Select the student's name column.
 - b) Eliminate the duplicate entry in table.
 - c) Sort the table in alphabetical order.
 - d) Select all the Students of a particular department.
4. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.
 - a) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.
 - b) Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
 - c) Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.
 - d) Select the suppliername and product_no where suppliername has 'r' or 'h' as second character.

5. Create a table master_book to contain the information of magazine code, magazine name, publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update, delete operations on the above table.
6. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
7. Create a table stock to contain the itemcode, itemname, current stock, date of last purchase. Write a stored procedure to seek for an item using itemcode and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.
8. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary . Use Cursor to update the employee salaries.
9. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table in oracle
10. Create a table to store the details of the Aluminus in an institution. Write a PL/SQL block to change address of a particular alumnus. Write proper exceptions and appropriate error messages.

UCSA405 COMPUTER APPLICATION IN BUSINESS

Semester : IV
Category : Allied
Class & Major : II UG

Credit : 3
Hours/Week : 3
Total Hours : 39

Objectives:

To enable the students

- Understand the concepts of computer application.
- Apply the application concepts in real time.
- Create web page with their own ideas using application.

UNIT -I COMPUTER BASICS

7 Hrs

Information Technology Basics - Information definition - Prerequisites of Information - need for Information - components of information Technology - Role of Information Technology in Business.

UNIT - II WORD PROCESSOR

8 Hrs

Word processing with MS Word: Starting Ms word - Msword environment - working with word documents - working with text - working with tables - checking spelling and grammar - printing a document.

UNIT - III SPREAD SHEET**8 Hrs**

Spreadsheets and Ms Excel: Starting Ms Excel - Ms Excel environment - Working with Excel workbook - working with worksheet - Formulas and functions - Inserting charts - printing in Excel.

UNIT - IV POWERPOINT**8 Hrs**

Making presentation with MS power point - starting Mspower point - Ms power point environment - working with power point - working with different views - designing presentation - printing in power point.

UNIT - V EDI**8 Hrs**

Electronic Commerce - Types - Advantages and disadvantages - Electronic data interchange (EDI) - How EDI works - EDI benefits - EDI limitations - SMART card - SMART card applications.

Text Book

- ITL ESL, *Introduction to Information Technology*, Second Edition, Pearson Education, New Delhi 2012.

Reference Books

- Sanjay Saxena, *A First course in Computers*, Second Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2008.
- Alexis Leon and Mathews Leon, *A beginner's guide to Computers*, Leon Press and Vikas publishing house private Ltd, New Delhi, 2001.
- Pradeep K.Sinha and Priti Sinha, *Computer Fundamentals*, Sixth Edition, BPB Publications, New Delhi, 2008

E-Resources

- <https://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf>
- <https://www.youtube.com/watch?v=n1cQPwZwTs4>
- <https://www.youtube.com/watch?v=2tc98DHIXh4>

UCSR410 COMPUTER APPLICATION IN BUSINESS – LAB

Semester : IV
Category : Allied Practical
Class & Major : II UG

Credit : 2
Hours/Week : 3
Total Hours : 39

Objectives:**To enable the students**

- Develop skill in document preparation.
- Create the power point presentation in business manner.
- Prepare database for the given data in business application.

I MS WORD

15 Hrs

1. a) Text Manipulation
b) Change the font size and type
c) Aligning and justification of Text
d) Underlining the Text
e) Indenting the Text
2. Prepare a Bio-data
3. Prepare a Business Letter
4. a) Usages of Numbering, Bullets, Footer and Headers.
b) Usages of Spell check and find and replace
c) Tables and manipulation
5. Create a mark sheet using table and find out the total marks.
6. Picture insertion and alignment
7. Prepare a greeting card
8. Prepare an invitation to be sent to specific addresses, in the data source using Mail Merge Concepts.

II MS EXCEL

11 Hrs

1. Electricity Bill preparation using cell formatting, data validation,
2. Formatting of charts.
3. Data sorting – Ascending and Descending (both numbers and alphabets)
4. Mark list preparation for a student using mathematical and statistical function, logical function, Date and time Function.

III MS POWERPOINT

13 Hrs

1. Inserting Clip and Pictures
2. Create a slide show presentation for a seminar (choose your own topic)
3. Preparation of Organization Charts
4. Create a slide preparation about the college and apply all animation effects.
5. Create a slide show presentation to display percentage of marks in each semester for all students and use different type of chart
6. Use different presentation template and different transition effect for each slide.

UCSE302 PROGRAMMING IN C

Semester : III
Category : Non-Major Elective
Class & Major : II UG

Credits : 2
Hours/Week : 2T+2P
Total Hours : 26T+26P

Objectives:

To enable the students

- Understand the concepts of the C programming language.
- Design, build, execute and debug C applications.
- Apply variables, arrays, strings, and flow control statement, point and disk files in C applications.

UNIT - I FUNDAMENTALS**5 Hrs**

Fundamentals of Programming – Algorithm & flow diagram - C fundamentals: character set – Identifiers and keywords – data types – constants – variables – declaration – expression – statements. Operators and Expression: arithmetic operators – unary operators – relational and logical operators – assignment operators – conditional operators and library function.

UNIT - II INPUT AND OUTPUT STATEMENTS**5 Hrs**

Data input and Output statements: getchar and putchar functions – scanf and printf function – more about scanf and printf functions. Control statements: if-else, while, do-while, for-nested control structure – switch – break –continue- comma operator – goto statement.

UNIT - III FUNCTIONS**5 Hrs**

Definition – accessing and function – function prototype –passing argument to a function – recursion. Program structure: storage classes – automatic variables – external variables – static variable.

UNIT - IV ARRAYS**5 Hrs**

Definition of array – processing array- passing array to function – Multidimensional arrays – arrays and strings. Pointers: Fundamentals – pointer declaration – passing pointer to a function – array of pointers.

UNIT - V STRUCTURE AND UNIONS**6 Hrs**

Definition of structure – processing structure – user defined data types- structure and pointers - passing structure to function – self referential structure- Unions - Bit wise operations.

Lab Exercise**26 Hrs**

1. Write a C program to input any 2 numbers and manipulate all arithmetic operations
2. Write a C program to convert Celsius to Fahrenheit and Fahrenheit to Celsius.
3. Write a C program to check whether a given year is leap year or not.
4. Write a C program to input a number and print whether that number is prime or not
5. Write a C program to perform matrix addition
6. Write a C program to perform matrix multiplication
7. Write a C program to search a number from the given set of numbers.
8. Write a C program to input a set of numbers and arrange it in ascending order
9. Write a C program to calculate NCR value using recursion
10. Write a simple C structure program.

Text Book

- Balagurusamy E., *Programming in ANSI C*, Third Edition, TMH Publishers, New Delhi, 2004.

UCSE304 HTML PROGRAMMING

Semester : II
Category : NME
Class &Major : II UG

Credit : 2
Hours/Week : 4
Total Hours : 52

Objectives:

To enable the students

- Implement basic concepts of the HTML language.
- Design a website using HTML.

Lab Exercise

1. Create a Simple webpage with HTML.
2. Create a Webpage with Different Heading Style.
3. Create a Table With Row and Column.
4. Create a table to show your class time-table.
5. Create a webpage and insert picture as a background.
6. Create a Webpage using HTML forms.
7. Design a webpage with three frames and insert image.
8. Create a Webpage with Different tags like Italic, Center, Paragraph, and Break.
9. Create a Webpage using all the list(Unordered List, Ordered List & Definition List)
10. Create a HTML Program with Marquee Direction for the Image.
11. Print a paragraph with 4 - 5 sentences. Each sentence should be a different font.
12. Print a paragraph. Each sentence should be a different font Color and Font Style.
13. Create a Webpage with Two Links to an External Document.
14. Create a Html program to Specify Height and Width of the Table.
15. Create some links to various search engines (google, yahoo, etc).
16. Create a page with a link at the bottom of it that when clicked will jump all the way to the top of the page.
17. Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on its own.
18. Create a Webpage for Advertisement with Links and Marquees.
19. Create a Personal webpage with all the Tags.
20. Create a Banner design using HTML tags.

UCSE402PROGRAMMING IN C++

Semester : IV
Category : Non-Major Elective
Class &Major : II UG

Credit : 2
Hours/week : 2T+2P
Total Hours : 6T+26P

Objectives:

To enable the students

- Analyse the concept of object oriented programming.
- Write simple applications using C++.
- Understand all file operations.

UNIT - I FUNDAMENTALS**6 Hrs**

Fundamentals of programming - Algorithm & flow diagram - Principles of procedure oriented programming and object oriented programming-Concepts of OOP-Benefits of OOP-Application of OOP.

UNIT - II CONTROLS**6 Hrs**

Tokens, Expressions and Control Structures.Functions in C++-Main Function-Function Prototyping-Call by Reference-Return by Reference-Inline Function-Function Overloading.

UNIT - III CLASSES AND OBJECTS**6 Hrs**

Classes and Objects-Specifying a Class-Defining member function-Nesting of member function-Arrays within a class-Memory Allocation for objects-Static Data members-Static Member Function-Arrays of Objects-Objects as Function arguments-Friendly Function.

UNIT - IV CONSTRUCTORS AND DESTRUCTORS**7 Hrs**

Constructors-Parameterized Constructors-Multiple Constructors in a Class-Dynamic Initialization of Objects-Copy Constructor-Dynamic Constructors-Destructors-Operator Overloading and Type Conversions.

UNIT - V INHERITANCE**7 Hrs**

Introduction-Defining Derived Classes-Single Inheritance-Making a Private Member Inheritable-Multilevel, Multiple, Hierarchical, Hybrid Inheritance –Virtual Base Classes-Pointers, Virtual Functions and Polymorphism.

Text Books

- E. Balagurusamy, *Object-Oriented Programming with C++*, Third Edition, Tata McGraw-Hill publishing, New Delhi,2007.
- Robert Lafore, *Object Oriented Programming with C++*, Galgotia Publishers, New Delhi, 2002.

Reference Books

- Herbert Schildt, *The Complete Reference C++*, 4th edition, Tata McGraw-HillPublishing,New Delhi,2003.
- Savitch, *Problem Solving with C++*, Sixth Edition, Pearson Education, New Delhi, 2009.

Lab Exercise**26 Hrs**

1. Write a program to calculate Simple Interest and Total amount.
2. Write a Program to check whether the entered number is Palindrome or not.
3. Write a program to enter a number. Count the number of digits from 0 to 9 occurring from 1 to entered number (Use Classes and Objects).
4. Write a program to exchange values between two classes using Friend Functions
5. Write a Program to find the area of triangle, rectangle and sphere using function overloading.
6. Write a program to define a Constructor and initialize then class data member variables with constants.(Use multiple constructors)
7. Write a program to create an object and release them using Destructors

8. Write a program to convert integer to date and vice versa using conversion function in Source classes.
9. Write a program to perform multiplication using an Integer and Object. (Use Operator overloading)
10. Write a program to create multilevel Inheritance.

UCSE403 MULTIMEDIA AND ITS APPLICATIONS

Semester : IV
Category : Non-Major Elective
Class &Major : II UG

Credit : 2
Hours/Week : 2T+2P
Total Hours : 6T+26P

Objectives:

To enable the students

- Gain knowledge in Multimedia concepts.
- Develop multimedia applications.
- Introduce Photoshop.

UNIT - I INTRODUCTION

5 Hrs

What is Multimedia? – Definition - Multimedia applications– Multimedia Skills and Training - Multimedia Hardware - Multimedia Software – Text in multimedia.

UNIT - II AUDIO & VIDEO

7 Hrs

Digital audio – sound card – recording techniques – recording software options recording process – editing terminology – editing with windows, cool edit – cool edit – features – audio transformation. Video: Introduction – video shooting – capturing process – post production concepts.

UNIT - III ANIMATION & GRAPHICS

6 Hrs

Introduction to animation – classifications – developing animation for multimedia project. Graphics: world colours – types of graphic storage – graphic tools – scanning and digital photography – basic attributes of an image – editing concepts – editing operations & manipulations.

UNIT - IV PHOTOSHOP

4 Hrs

Basic Tools: Selection tools – Clone stamp tools – Brush tools – Grids – Scaling images – Moving and merging Layers – Tool Palette – Screen capturing – Grey styling – Using style Palette – Layers: Copying selections – Creating layers – Transforming layers – Copying layers between images – Arranging layers.

UNIT -V BLENDING AND COMPOSITING

4 Hrs

Opacity and Blending Modes – Feathering Edges – Image Modes: Mode characteristics – Grayscale and Bitmap Modes – Color Modes. Layer Effects - Text, Layer Effects and Filters.

Lab Exercise **26 Hrs**

1.Photo Effects **4 Hrs**

Decolouring, changing cloth texture and pattern, changing background, applying soft light effect.

2. Photo Retouching **4 Hrs**

Color correction, blending images, smooth skin effects adding blur effects to background.

3. Text Effect **7 Hrs**

Creating metatite text, shining text, illumines text transparent glass text, digital banner.

4. Image Editing **4 Hrs**

Creating simple imagesEditing-Resize, Change color depth, resolution, file format, brightness, add and edit layer style, add text.

5. Image Editing **7 Hrs**

Stitch and edit two images into single using selection, lasso and alone stamp tools (Masking)

Text Books

- S.Gokul ,*Multimedia Magic*, BPB Publications, New Delhi, 2010.
- Nick vandome, *Photoshop elements 9,Jumpstrat*, McGraw Hill Edition, New Delhi, 2011.

Reference Books

- Tay Vaughan, *Multimedia: Making it Work*, Fifth Edition,Tata McGraw Hill New Delhi, 2011.
- Ben Willmore and Dan Ablan, *Adobe Photoshop CS4 Studio Techniques*, Peachpit Publishers, 2008.

UCSE404 VISUAL PROGRAMMING

Semester : IV
Category : Non-Major Elective
Class &Major : II UG

Credits : 4
Hours/week : 2T+2P
Total Hours : 26T+26P

Objectives:

To enable the students

- Apply the concepts of windows programming.
- Understand GUI programming using Microsoft Foundation Classes.
- Design simple programming project.

UNIT - I FUNDAMENTALS

5 Hrs

Programming Fundamentals - Algorithm & flow diagram - Customizing a Form - Writing Simple Programs.

UNIT - II TOOLBOX **6 Hrs**

Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers.

UNIT - III LOOPS **5 Hrs**

Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.

UNIT - IV ARRAY **5 Hrs**

Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control.

UNIT-V FORMS **5 Hrs**

Projects with Multiple forms - Do Events and Sub Main - Error Trapping.VB Objects - Dialog Boxes - Common Controls - Menus - MDI Forms.

Lab Exercise **26 Hrs**

1. Write a simple program using all arithmetic operations in VB
2. Design a Simple Calculator.
3. Use option and check box to create question bank
4. Use combo box and list box to create a simple application
5. Create VB Application using Image and Picture control
6. Create VB Application using Common Dialog Box.
7. Implement String functions using Menu Control.
8. Create VB Application using Rich Text Box control.
9. Create Color Palette using Slider control and scroll bar
10. Create Student Information using MDI Forms.

Text Books

- Gary Cornell, *Visual Basic 6 from the Ground up*, 31st Reprint, Tata McGraw Hill, New Delhi, 2010.
- Noel Jerke, *Visual Basic 6 The Complete Reference*, 28th Reprint, Tata McGraw Hill, New Delhi, 2008.

Reference Book

- Deitel and Deitel, *Visual Basic 2005*, Third Edition, Pearson Education, New Delhi, 2007.

UCSE405WEB DESIGNING

Semester	: IV	Credit	: 2
Category	: Non-Major Elective	Hours/Week	: 2T+2P
Class & Major	: II UG	Total Hours	: 26T+26P

Objectives:

To enable the students

- Gain the knowledge of scripting language.
- Make use of the basic concepts of the HTML to create Web Page.
- Usage of tags, tables, frames, forms, CSS to design Web page.

UNIT - I HTML **6 Hrs**

Introduction – Web Server, Web Client / Web Browser, HTML Tags, HTML commands, Text Formatting, heading Styles, Drawing Lines.

UNIT - II TEXT **5 Hrs**

Text Styles, Other Text Effects, Lists, types of Lists

UNIT - III TABLES **5 Hrs**

Adding graphics to HTML Documents, Tables

UNIT - IV FRAMES **5 Hrs**

Linking Documents, Frames, Forms

UNIT - V DYNAMIC HTML **5 Hrs**

CSS, Class, SPAN tag, Types of Style Sheet

Lab Exercises **26 Hrs**

1. Design a Web Page using tags of different Heading Styles
2. Design a Web Page using all types of tags
3. Create a Web Page with various Text Styles and effects
4. Create a index of book using list
5. Time table generation using tables
6. Display an image as background for a web page
7. Creating a web page using Frames for Advertisement
8. Design a Bill for shopping mall using Forms
9. Creation of E-Book
10. Creating a web page using External style sheet

Text Book

- Ivan Bayross, *Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, PERL, CGI*, 3rd edition, Tata McGraw Hill, 2012.

Reference Books

- Thomas A Powell, *The Complete Reference, HTML*, Second edition, McGraw Hill, New Delhi, 1996.
- Steven Holzner, *HTML Black Book*, Second Edition, Wiley Publication, New Delhi, 2002.

III and IV Evaluation Components of CIA

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
III	III	Core V	UCSM304	Java Programming	Program writing	Debugging
	III	Core Practical IV	UCSR303	Java Programming Practical	DPA	Viva Voce
	IV	NME	UCSE304	HTML Programming	DPA	Viva Voce
	III	Allied	UCSA303	Multimedia	Assignment	Designing
	III	Allied Practical	UCSR306	Multimedia – lab	DPA	Viva Voce
IV	III	Core VI	UCSM405 / UCAM405	Data Communication Network	Working Model	Seminar
	III	Core VII	UCSM406	Web programming	Problem solving	Seminar
	III	Core VIII	UCSM407	Data Base Management System	Problem solving	Seminar
	III	Core Practical V	UCSR409	Web Programming – Lab	DPA	Viva Voce
	III	Core Practical IV	UCSR404	Database Management System -Practical	DPA	Viva Voce
	IV	Allied	UCSA405	Computer Applications in Business	Assignment	Seminar
	IV	Allied Practical	UCSR409	Computer Applications in Business – Lab	DPA	Viva Voce
	III	Allied	UCSA304	Mathematical Programming using C	Assignment	Problem Solving
	III	Allied Practical	UCSR307	Mathematical Programming using C – Lab	DPA	Viva Voce
	IV	NME	UCSE402	Programming in C++	Assignment	Problem Solving
	IV	NME	UCSE403	Multimedia and its Applications	Assignment	Designing
	IV	NME	UCSE404	Visual Programming	Assignment	Problem Solving
	IV	NME	UCSE405	Web Designing	Designing	Problem Solving

COURSE PROFILE: M.Sc. (Computer Science)

Semester	Category	Course Code	Course Title	Contact Hrs/Week	Credit	
					Min	Max
I	Core I	PCSM108	Theoretical Foundations for Computers	5	4	4
	Core II	PCSM109	Open source Technologies	5	5	5
	Core III	PCSM110	Advanced Java Programming	5	4	4
	Core Practical I	PCSR104	Advanced Java Programming - Lab	4	3	3
	Core Practical II	PCSR105	Open source Technologies - Lab	5	3	3
	Non Major Elective			5	4	4
	Core		Library	1	-	-
Total				30	23	23
II	Core IV	PCSM206	Compiler Design	4	4	4
	Core V	PCSM209	Web Programming	4	3	3
	Core VI	PCSM210	Design and Analysis of Algorithms	4	3	3
	Core VII	PCSM208	Research Methodology	4	3	3
	Core VIII	PCSM211	Software Testing	4	3	3
	Core Practical III	PCSR205	Web Programming - Lab	4	3	3
	Non Major Elective	PALE201/ PALE301	Preparatory Course for NET/SET	5	4	4
	Service Learning	PCSX201/ PCAX201	Introduction To Information Technology	-	1	1
Core		Library	1	-	-	
Total				30	24	24
III	Core IX	PCSM309	TCP / IP Networks	4	3	3
	Core X	PCSM310	Service Oriented Architecture	4	4	4
	Core XI	PCSM311	Cloud Computing	5	4	4
	Core XII	PCSM312	Big Data Analytics	4	4	4
	Core Practical IV	PCSR304	Networking – Lab	4	3	3
	Core Practical V	PCSR305	Big Data Analytics - Lab	4	3	3
	Core Practical VI	PCSR302	Mini Project	2	2	2
	Value Education	PWSV301	Gender Studies	2	2	2
Core		Library	1	-	-	
Total				30	25	25
IV	Core XIII	PCSM403	Internet Of Things	5	4	4
	Core XIV	PCSM404	Digital Image Processing	5	4	4
	Core Project I	PCSP402	Project	17	8	8
	Value Education	PWSV402	Women's Studies	2	2	2
	Core		Library	1	-	-
Total				30	18	18
Grand Total				120	90	90

COURSES OFFERED TO OTHER DEPARTMENTS
(Major and Major Elective)

Course	Semester	Category	Course Code	Course Title	Contact Hrs/Week	Credit
M.Sc Tamil	IV	Major Elective	PTAM406	Kaninipayanpattiyal	5	3
M.Sc Bio Informatics	I	Core III	PBIM103	Introduction to Computer Programming	6	4
	I	Core Practical I	PBIR102	Introduction to Computer Programming- Lab	6	4
	II	Core VI	PBIM203	Computer Programming in Perl and CGI	5	4
	II	Core Practical II	PBIR201	Computer Programming in Perl and CGI- Lab	4	2
	IV	Core XII	PBIM401	Database Management Systems	5	5

NON-MAJOR ELECTIVE

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Non Major Elective	PCSE101	Web designing tools	3T+2P	4
		PCSE102	Object Oriented Programming	3T+2P	4
		PCSE204	Worksheet Analysis	3T+2P	4

PCSM309 TCP/IP NETWORKS

Semester : III
Category : Core IX
Class & Major : II M.Sc Computer Science

Credit : 3
Hours/Week : 4
Total Hours : 52

Objectives:

To enable the students

- Understand the concepts of TCP/IP.
- Examine the process of TCP/IP.
- Implement TCP/IP concepts in network.

UNIT - I INTRODUCTION

11 Hrs

Internetworking concepts and architectural model- classful Internet addresses – CIDR-Subnetting and Supernetting –ARP- RARP- IP – IP Routing –ICMP – Ipv6

UNIT - II TCP

11 Hrs

Services – header – connection establishment and termination- interactive data flow- bulk data flow- timeout and retransmission – persist timer - keepalive timer- futures and performance

UNIT - III IP IMPLEMENTATION

10 Hrs

IP global software organization – routing table- routing algorithms-fragmentation and reassembly- error processing (ICMP) –Multicast Processing (IGMP).

UNIT - IV TCP IMPLEMENTATION - I

10 Hrs

Data structure and input processing – transmission control blocks- segment format-comparison-finite state machine implementation-Output processing- mutual exclusion-computing the TCP data length.

UNIT - V TCP IMPLEMENTATION - II

10 Hrs

Timers-events and messages- timer process- deleting and inserting timer event- flow control and adaptive retransmission-congestion avoidance and control – urgent data processing and push function.

Text Books

- Douglas E.Comer, *Internetworking with TCP/IP Principles, Protocols and Architecture*, Vol.1 & 2 6th editions, Pearson Education Asia, 2013.
(Unit I in Comer Vol. I, Units II, IV & V – Comer Vol. II)
- W.Richard Stevens, *TCP/IP illustrated*, Volume 1, 6th edition, Pearson Education, 2011. (Unit II)

Reference Books

- Forouzan, *TCP/IP protocol suite*, 2nd edition, TMH, 2003.
- W.Richard Stevens, *TCP/IP illustrated*, Volume 2, Pearson Education, 2003.

E-Resource

- <http://www.amazon.com/Internetworking-TCP-IP-One-6th/dp/013608530X>

PCSM310 SERVICE ORIENTED ARCHITECTURE

Semester	: III	Credit	: 3
Category	: Core X	Hours/Week	: 4
Class & Major	: II M.Sc CS	Total Hours	: 52

Objectives:

To enable the students

- Understand the concepts of Service Oriented Architecture.
- Analyse the techniques of Service Oriented Architecture.
- Implement Service Oriented Architecture in Java.

UNIT - I INTRODUCTION 10 Hrs

Root of SOA - Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures - Anatomy of SOA- How components in an SOA interrelate – Principles of service orientation.

UNIT - II WEB SERVICES 10 Hrs

Web services – Service descriptions – Messaging with SOAP – Message exchange Patterns – Coordination – Atomic Transactions – Business activities – Orchestration – Choreography – Service layer abstraction – Application Service Layer – Business Service Layer - Orchestration Service layer.

UNIT - III SOA 10 Hrs

Service oriented analysis – Business – Centric SOA- Deriving business services- service modeling – Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity – Centric business service design – Application service design – Task – centric business service design.

UNIT - IV JAVA API 12 Hrs

SOA platform basics – SOA support in J2EE – Java API for XML- based web services (JAX-WS) – Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) – Java API for XML based RPC (JAX-RPC) – Web Services Interoperability Technologies (WSIT) – SOA support in .NET – Common Language Runtime – ASP.NET web services – Web Services Enhancements (WSE).

UNIT - V WS 10 Hrs

WS- BPEL basics – WS – Coordination overview – WS – Choreography, WS – Policy, WS – Security.

Text Book

- Thomas Erl, *Service-Oriented Architecture: Concepts, Technology, and Design*, Pearson Education, 2005.

References

- Thomas Erl, *SOA Principles of Service Design* (The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.

- Newcomer, Lomow, *Understanding SOA with Web Services*, Pearson Education, 2005.
- Sandeep Chatterjee, James Webber, *Developing Enterprise Web Services, an Architect's Guide*, Pearson Education, 2005.

E-Resource

- http://www.opengroup.org/soa/source-book/soa_refarch/

PCSM311 CLOUD COMPUTING

Semester	: III	Credit	: 4
Category	: Core XI	Hours/Week	: 5
Class & Major	: II M.Sc Computer Science	Total Hours	: 65

Objectives:

To enable the students

- Understand the Cloud computing concepts.
- Gain substantial knowledge in application of cloud computing
- Identify the cloud services.

UNIT - I INTRODUCTION

13 Hrs

Introduction – Cloud computing basics – overview – Applications – Intranets and the cloud – First Movers in the Cloud- Organization and cloud computing- Benefits – Limitations – Security Concerns.

UNIT - II BUSINESS CASE FOR CLOUD COMPUTING

13 Hrs

Business case for going to the cloud. – Cloud Computing Services – applications in Business – Deleting your datacenter – Hardware and Infrastructure – Clients –Security – Network –services – Standards.

UNIT -III ACCESSING THE CLOUD

13 Hrs

Accessing the Cloud-Platforms – Web Applications –web APIs – web Browsers - Cloud Storage – overview – Cloud storage providers-standards– Software as a service - software plus Services – Developing application.

UNIT - IV CLOUD COMPUTING AT WORK

13 Hrs

Cloud computing at work : Driving forces – Company offerings –Industries -software plus Services – overview - Developing application – Google – Microsoft –Development – troubleshooting – Application Management.

UNIT -V BEST PRACTICES FOR CLOUD COMPUTING

13 Hrs

Local clouds and Thin Clients –Server Solution – Thin Clients –Migrating to the cloud – Cloud Services for Individuals-Enterprise class cloud offerings –Migration –Cloud Computing evaluation.

Text Book

- Anthony T.Velte, Toby J.Velte Robert elsenpeter, *Cloud Computing –A Practical approach*, Tata McGraw Hill Publications, 2010.

Reference Books

- Barrie sosinsky, *Cloud Computing Bible*, Wiley publishing Inc., 2011.
- BorkoFurht, Armando Escalante, *Handbook of Cloud Computing*, Springer, 2010.

PCSM312 BIG DATA ANALYTICS

Semester	: III	Credit	: 4
Category	: Core XII	Hours / Week	: 4
Class & Major	: II M. Sc Computer Science	Total Hours	: 52

Objectives:

To enable the students

- Understand the concepts in Database.
- Analyse the data using Regression and Bayesian Modeling.
- Choose appropriate algorithm to perform Data mining.

UNIT - I INTRODUCTION TO BIG DATA 10 Hrs

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability - analytic processes and tools - Analysis VS reporting.

UNIT - II STATISTICAL CONCEPTS 8 Hrs

Modern data analytic tools - Statistical concepts - Sampling distributions - re-sampling - statistical inference - prediction error.

UNIT - III DATA ANALYSIS 12 Hrs

Regression modeling - Multivariate analysis - Bayesian modeling - inference and Bayesian networks - Support vector and kernel methods - Analysis of time series - linear systems analysis - nonlinear dynamics - Rule induction.

UNIT - IV DATA MINING 10 Hrs

Introduction to Data Mining- Data Categories- Data Mining Process- Data Mining Task Primitives- Trends in Data Mining- Applications of Data Mining. Association rules: Introduction- APRIORI algorithm- Improved APRIORI algorithm- FP Growth algorithm- NAÏVE algorithm- Improved NAÏVE algorithm.

UNIT - V DATA WAREHOUSING 12 Hrs

Introduction for Data Warehousing- Need for Data Warehousing- Data Warehouse- Definition and Characteristics- Data Warehouse Architecture- Components of Data Warehouse- Design Considerations- Technical Considerations- Implementations Considerations- Benefits of Data Warehousing- ETL Process.

Text Books

- Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer, 2007.
- AnandRajaraman and Jeffrey David Ullman, *Mining of Massive Datasets*, Cambridge University Press, 2012.
- Pete Warden, *Big Data Glossary*, O'Reilly, 2011.

Reference Books

- Jay Liebowitz, *Big Data and Business Analytics*, Auerbach Publications, CRC press (2013).
- EMC Education Services, *Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data*, I edition, 2015.
- ArvindSathi, *BigDataAnalytics: Disruptive Technologies for Changing the Game*, MC Press, 2012.

E-Resources

- <http://postscapes.com>
- <http://www.bigdataanalysis.eu/what-is-bigdata>

PCSR304 NETWORKING - LAB

Semester	: III	Credits	: 3
Category	: Core Practical IV	Hours/Week	: 5
Class &Major	: II M.Sc Computer Science	Total Hours	: 65

Objectives:

To enable the students

- Understand concepts in Network.
- Apply programming skills in network.
- Develop application in network.

Lab Exercise

1. Implementation of ECHO server using Socket Programming
2. Programs using UDP Sockets (like simple DNS)
3. Programs using TCP (like packet capturing and filtering)
4. Programs using RPC
5. Implementation of RMI
6. Simulation of sliding window protocol
7. Implementation of ARP
8. Implementation of RARP
9. a) Study of network simulator –NS2
b) Network simulator GloMoSim
10. Simulation of Dynamic Routing Protocol

PCSR305 BIG DATA ANALYTICS – LAB

Semester	: III	Credits	: 3
Category	: Core practical V	Hours/Week	: 4
Class & Major	: II M.Sc Computer Science	Total/Hours	: 60

Objectives:

To enable the students

- Understand Analytical concepts using PIG
- Gain knowledge on higher level of abstraction
- Develop programming skills in PIG.

Lab Exercise

1. I/O operations
2. Split and union
3. Filters
4. Statements
5. Joins
6. Flattening
7. Sample and parallel
8. Advanced relational operations
9. Built in user defined functions
10. Embedded functions

PCSM403 INTERNET OF THINGS

Semester	: III	Credits	: 4
Category	: Core XIII	Hours/Week	: 5
Class & Major	: II M. Sc Computer Science	Total Hours	: 65

Objectives:

To enable the students

- Understand the basic issues, policy and challenges in the Internet.
- Examine the components and the protocols in Internet.
- Build a small low cost embedded system with the Internet.

UNIT - I INTRODUCTION

12 Hrs

Definition – phases – Foundations – Policy– Challenges and Issues - identification - security –privacy. Components in internet of things: Control Units – Sensors – Communication modules – Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks – Mobile Internet – Wired Communication.

UNIT - II PROGRAMMING THE MICROCONTROLLER FOR IOT 13 Hrs

Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors- Communication: Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / Ethernet.

UNIT - III RESOURCE MANAGEMENT IN THE INTERNET OF THINGS 14 Hrs

Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture - The Role of Context - Design Guidelines -Software Agents for Object – Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy-Enabling Autonomy and Agility by the Internet of Things-Technical Requirements for Satisfying the New Demands in Production.

UNIT - IV BUSINESS MODELS FOR THE INTERNET OF THINGS 13 Hrs

The Meaning of DiY in the Network Society- Sensor-actuator Technologies and Middleware as a Basis for a DiY Service Creation Framework - Device Integration - Middleware Technologies Needed for a DiY Internet of Things Semantic Interoperability as a Requirement for DiY Creation-Ontology- The Internet of Things in Context of EURIDICE - Business Impact

UNIT - V FROM THE INTERNET OF THINGS TO THE WEB OF THINGS 13 Hrs

Resource-oriented Architecture and Best Practices- Designing RESTful Smart Things - Web-enabling Constrained Devices - The Future Web of Things - Set up cloud environment – send data from microcontroller to cloud – Case studies – Open Source e-Health sensor platform – Be Close Elderly monitoring – Other recent projects.

Text Books

- Charalampos Doukas, *Building Internet of Things with the Arduino*, Create space, April 2002.
- Dieter Uckelmann et.al, *Architecting the Internet of Things*, Springer, 2011.

References Book

- Luigi Atzori et.al, *The Internet of Things: A survey*, Journal on Networks, Elsevier Publications, October - 2010.

E-Resources

- <http://postscapes.com/>
- <http://www.theinternetofthings.eu/what-is-the-internet-of-things>

PCSM404 DIGITAL IMAGE PROCESSING

Semester	: IV	Credits	: 3
Category	: Core XIII	Hours/week	: 5
Class & Major	: II M. Sc Computer Science	Total Hours	: 65

Objectives:

To enable the students

- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

UNIT - I DIGITAL IMAGE FUNDAMENTALS 11 Hrs

Elements of digital image processing systems, Vidicon and Digital Camera working principle, Elements of visual perception, brightness, contrast, hue, saturation, Mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither.

UNIT - II IMAGE ENHANCEMENT 15 Hrs

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Conharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT - III IMAGE RESTORATION 13 Hrs

Image Restoration - degradation model, Unconstrained restoration – Lagrange multiplier and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations.

UNIT - IV IMAGE SEGMENTATION 13 Hrs

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Segmentation by morphological watershed – basic concepts – Dam construction algorithm.

UNIT - V IMAGE COMPRESSION 13 Hrs

Need for data compression, Huffman, Run Length Encoding, Shiftcodes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

Textbooks

- Rafael C. Gonzalez, Richard E. Woods, *Digital Image Processing*, Pearson, 2nd Edition, 2004.
- Anil K. Jain, *Fundamentals of Digital Image Processing*, Pearson 2002.

References

- Kenneth R. Castleman, *Digital Image Processing*, Pearson, 2006.
- Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, *Digital Image Processing using MATLAB*, Pearson Education, Inc., 2004.
- D.E. Dudgeon and R.M. Mersereau, *Multidimensional Digital Signal Processing*, Prentice Hall Professional Technical Reference, 1990.
- William K. Pratt, *Digital Image Processing*, John Wiley, New York, 2002
- Milan Sonka et al, *Image Processing, Analysis and Machine Vision*, Brookes/Cole, Vikas Publishing House, 2nd edition, 1999.

PTAM406 fzpdpg; gad;ghl;bay;

gUtk; : ehd;fhk; gUtk;
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tFg;G : II M.A Tamil

juk; : 4
kzp Neuk; / thuk; : 5(3T+2P)
nkhj;j kzpNeuq;fs; : 39T +26P

Nehf;fk; :

- fzpg;nghwpapd; mikg;G kw;Wk; gad;ghL Fwpj;j mwptg; ngWjy;.
- ,izaj;jpy; jfty; Njly; kw;wk; kpd;dQ;ry; mDg;Gjy;.
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myF – II

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nkd;nghUl;fspd; xg;gPL.

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myF – III

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- kpd;dQ;ry; mDg;Gk; Kiw.

myF – IV

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juT nkhopapay;.

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fzpdp Ma;T – nraw;if mwptj;jpwd;.

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PBIM401 DATABASE MANAGEMENT SYSTEMS

Semester : IV

Credit : 5

Category : Core XII

Hours/Week : 5

Class & Major : II M.Sc. Bio Informatics

Total Hours : 65

Objectives

To enable the students

- Acquire Knowledge on basic & practical skills on RDBMS
- Apply the data storage & indexing techniques.
- Understand query Optimization and Transaction management.

UNIT- I INTRODUCTION

10 Hrs

Introduction – purpose of database system – data models – database languages – Transaction management – Storage management – DBA – database users – system structure.

UNIT- II ENTITY RELATIONAL MODEL

10 Hrs

E-R model – Hierarchical model – Network Model.

UNIT - III STRUCTURAL RELATIONAL

15 Hrs

Structural Relational databases – Relational Algebra – Tuple Relational Calculus – Domain Relational Calculus – Normalization.

UNIT- IV INDEXING

15 Hrs

Indexing and Hashing – Query Processing – Concurrency Control – Security – Sequence analysis, Sequence data Banks, Structural Data Banks .

UNIT- V ADVANCED CONCEPTS

15 Hrs

Advanced Database Concepts – Emerging Applications in Genomic databases.

Text Book

- Abraham Silberchatz, Henry F. Korth, S. Sudharshan, *Database System Concepts*, 5th Edition, McGraw Hill, 2005.

Reference Books

- Elisa Bertino and Lorenzo Martino., *Object-Oriented Database Systems Concepts and Architectures*, Boston, USA, 1stEdition, Addison-Wesely Longman Publishing Co, 1993.

- VikramVaswani., *The Complete reference MySql*, 1st Edition, TataMcGraw-Hill, New Delhi, 2002

III and IV Evaluation Components of CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core X	PCSM309	TCP / IP Networks	Working Model	Seminar
	Core XI	PCSM310	Service Oriented Architecture	Case study	Seminar
	Core XIII	PCSM311	Cloud Computing	Working Model	Seminar
	Core XII	PCSM312	Big Data Analytics	Problem Solving	Seminar
	Core Practical IV	PCSR306	Networking – Lab	DPA	Viva Voce
	Core Practical V	PCSR304	Big Data Analytics - Lab	DPA	Viva Voce
IV	Core IX	PCSM403	Internet of things	Problem Solving	Seminar
	Core XIII	PCSM404	Digital Image Processing	Problem Solving	Seminar

DEPARTMENT OF COMPUTER APPLICATIONS & ISM

Preamble

UG : Course profile, list of courses offered to other departments and the syllabi of courses in the III & IV semesters along with evaluation components III & IV (with effect from 2015-2018 batch onwards) and

PG : Course profile, list of courses offered to the other departments and the syllabi of courses in the III & IV semesters along with evaluation components III & IV (with effect from 2015-2018 batch onwards) are presented in the booklet.

COURSE PROFILE: BCA

Semester	Part	Category	Course Code	Course Title	Contact Hrs/Week	Credit	
						Min	Max
I	I	Language	UTAL105/ UTAL106/ UHIL101/ UFRL101	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I/French-I	4	2	3
	II	English	UENL107/ UENL108	Basic English-I/ Advanced English-I	5	3	4
	III	Core I	UCAM105/ UCSM104	Programming in C	5	4	4
	III	Core II	UCAM106	Digital Logic Computer Design	4	3	3
	III	Core Practical I	UCAR103/ UISR103	Introduction to Computer Applications	2	1	1
	III	Core Practical II	UCAR104/ UCSR107	Programming in C- Practical	3	3	3
	III	Allied I	UMAA110	Mathematical Methods-I	5	4	4
	IV	Value Education			2	1	1
Total					30	21	23
II	I	Language	UTAL205/ UTAL206/ UHIL201/ UFRL201	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I/French-I	4	2	3
	II	English	UENL207/ UENL208	Basic English-I/ Advanced English-I	5	3	4
	III	Core III	UCAM203/ UCSM204	Object Oriented Programming using C++	4	4	4
	III	Core IV	UCAM204/ UCSM205	Data Structure and Algorithms	3	3	3
	III	Core Practical III	UCAR203/ UCSR204	Object Oriented Programming and Data Structures using C++-Practical	3	3	3
	III	Allied II	UMAA216	Mathematical Methods-II	5	4	4

	IV	Non - Major Elective			4	2	2
	IV	Soft Skill			2	1	1
	V	Extension Programme/ Physical Education			-	1	2
Total					30	23	26
III	III	Core V	UCAM307	Java Programming	5	4	4
	III	Core VI	UCAM308	MIS and ERP	5	3	3
	III	Core VII	UCAM309	User Interface Design	5	5	5
	III	Core Practical IV	UCAR303	Java Programming - Practical	4	3	3
	III	Allied III	UCOA303	Financial Accounting	5	5	5
	IV	Non-Major Elective			4	2	2
	IV	Value Education			2	1	1
Total					30	23	23
IV	III	Core VIII	UCAM404	Database Management System	5	4	4
	III	Core IX	UCAM403	Object Oriented Analysis and Design	4	3	3
	III	Core X	UCAM405/ UCSM405	Data Communication Networks	4	3	3
	III	Core XI	UCAM406	Data Mining and Warehousing	4	3	3
	III	Core Practical V	UCAR402	Database Management System -Practical	3	3	3
	III	Core Practical VI	UCAR403	Case Tools Lab	3	3	3
	III	Allied IV	UCOA403/ UCOR403	Accounting Package	5	5	5
	IV	Soft skill			2	1	1
	V	Extension Programme/ Physical Education			-	-	2
Total					30	25	27
V	III	Core XII	UCAM501	Visual Programming	4	3	3
	III	Core XIII	UCAM504/ UCSM507	Software Engineering	5	5	5
	III	Core XIV	UCAM505	Web Programming	4	3	3
	III	Core XV	UCAM506	Multimedia	4	3	3
	III	Core XVI	UCAR504	Visual Programming-Practical	3	2	2

	III	Core Practical VII	UCAR505	Web Programming Lab	3	2	2
	III	Allied Optional			5	4	4
	IV	Value Education			2	1	1
Total					30	23	23
VI	III	Core XVI	UCAM606	Operating Systems	5	4	4
	III	Core XVII	UCAM607	Software Testing	6	4	4
	III	Core XVIII	UCAM608	Computer Graphics	4	4	4
	III	Core Practical VIII	UCAR602	Operating Systems Lab	3	3	3
	III	Core Project	UCAP601	Project Work	5	4	4
	III	Major-Elective	UCAO605/ UCAO604	Big Data Analysis/ Cloud Computing	5	4	4
	III	Viva-Voce	UCAC601	Comprehensive Viva Voce	-	1	1
	IV	Soft skill			2	1	1
	V	Extension Programme/ Physical Education			-	-	2
Total					30	25	27
Grand Total					180	140	149

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course Code	Course Title	Contact Hrs/ Week	Credit	
						Min	Max
II	III	Summer Internship	UCAI201	Summer Internship	-	-	1
III	III	Self Study Paper	UIDM301	Working Model	-	-	1
IV	III	Summer Internship	UCAI401	Summer internship	-	-	1
V	III	Self Study Paper	UIDM501	Self Study Paper	-	-	1

NON-MAJOR ELECTIVES

Semester	Part	Category	Course Code	Course Title	Contact Hrs/ Week	Credit
II	IV	NME	UCAE205	Desktop Publishing	4	2
			UCAE206	PC Hardware Troubleshooting	4	2
III	IV		UCAE305	Internet Applications	4	2
			UCAE306	Web Tools	4	2

ALLIED OPTIONAL

Semester	Part	Category	Course Code	Course Title	Contact Hrs/ Week	Credit
V	III	Allied Optional	UCAA504	E-Commerce	3T + 2P	4
V	III	Allied Optional	UCAA505	Web Technology	3T + 2P	4

UCAM307 JAVA PROGRAMMING

Semester : III

Category : Core V

Class & Major : II BCA

Credit : 4

Hours/Week : 5

Total Hours : 65

Objectives:

To enable the students

- Understand the OOP Concepts, Exception and String Handling in Java.
- Construct programs using Applets and JDBC concepts.
- Execute Java and Applet Programs in various applications.

UNIT -I INTRODUCTION

10 Hrs

Fundamentals of Object Oriented Programming:Java Evolution – Overview of Java Language – Data Types, variables, arrays – Operators – Control statements.

UNIT –II CLASSES AND METHODS

12 Hrs

Introduction to classes – class fundamentals – Declaring objects – Constructors – Methods and Classes – Overloading methods – static - final - Nested and Inner classes – Inheritance – Method Overriding – Packages – Interfaces.

UNIT – III EXCEPTION HANDLING AND FILES

13 Hrs

Exception handling – Types of Exception – try and catch – nested try – throw and throws – Multithreading Programming –I/O Streams – Reading and Writing files – Reading and writing Console I/O.

UNIT – IV STRING HANDLING AND AWT

15 Hrs

String Handling- String Operations: Comparison – Modifying String – String Buffer - AWT classes – Window fundamentals – Working with Frame windows, Graphics - Java Swing.

UNIT – V APPLETS

15 Hrs

Applet Class – Applet Architecture – The HTML Applet Tag – Passing parameters in Applets – Applet Context – Improving the Banner Applet – get() Method - JDBC Concepts.

Text Books

- Herbert Schildt, *Java 2 Complete Reference*, Tata McGraw Hill, 8th Edition, 2011.
Unit I : Chapter 2, 3, 4
Unit II : Chapter 6,7,8,9
Unit III : Chapter 10, 11, 12
Unit IV : Chapter 13, 21, 26
Unit V : Chapter 19
- Kogent Solution Inc, *Java 6 Programming Black Book*, Dreamtech press, 2009.
Unit V : Chapter 29

Reference Books

- E. Balagurusamy , *Programming with Java A Primer*, Tata McGraw Hill, Fourth Edition, 2010.
- Cay S. Horst Mann & Gary Cornell, *Core java*, Volume II (9th ed.), Sun Microsystems Press Java Series, 2012.

E-Resources

- <http://www.w3schools.com/html/>
- <https://www.youtube.com/watch?v=oqJy4e6Aa0M>
- <https://www.youtube.com/watch?v=7r3Vln4bGLk>

UCAM308 MIS AND ERP

Semester : III
Category : Core VI
Class & Major : II BCA

Credit : 3
Hours/Week : 5
Total Hours : 65

Objectives:

To enable the students

- Define transaction and decision making process.
- Analyse the risks and benefits of MIS and ERP in enterprises.
- Evaluate the production, marketing and accounting information in ERP.

UNIT - I OVERVIEW OF MIS

13 Hrs

Definition of MIS-MIS as an evolving concept-MIS and other academic disciplines-Structure of a MIS: Operating elements of an information system-Management activity-organizational function-Hardware, software AND communications technology for information system: A computer system-Data representation for computers-instructing a computer-communication facilities-communication networks-distributed systems.

UNIT - II STORAGE AND RETRIEVAL OF DATA

12 Hrs

Physical versus logical models of data-logical data concepts and definitions-physical storage devices-file organizations-Database organizations-Transaction processing systems, office automation and information processing control functions: transaction processing- document preparation-message and document communication-information processes control.

UNIT - III DECISION MAKING PROCESS

15 Hrs

Intelligence and design phases-concepts of decision making-behavioral models of the decision maker-behavioral model of organizational decision making-decision making under psychological stress-methods for deciding among alternatives-documenting and communicating decision rules-Relevance of decision-making concepts for information system design. Concepts of information: definition-information in the mathematical theory of communication-quality of information-value of information in decision making.

UNIT - IV ERP AND FUNCTIONAL MODULES

13 Hrs

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to be consider in planning design and implementation of cross functional integrated ERP systems- Overview of ERP software solutions- Small medium and large enterprise vendor solutions, BPR, Business Engineering and best Business practices - Business process Management.

UNIT - V CRM

12 Hrs

Marketing information system and sales order process in ERP: Sales and distribution in ERP- Pre sales activities- Sales order processing- inventory sourcing- Delivery- Billing- Payment- Customer relationship management- benefits of CRM.

Text Books

- Gordon B. Davis AND Margrahe H.Olson , *Management Information System*, Mc Graw Hill, Third edition, 2010.
Unit-I : Chapter 1,2,3,4
Unit-II : Chapter 5,7,8,9
Unit-III : Chapter 10,11,12
- Alexis Leon, “*ERP demystified*”, Third Edition, Tata McGraw-Hill, 2014
Unit IV : Chapter 3,4,5,6
Unit V : Chapter 7,8,9

Reference Books

- *Enterprise Resource Planning – A Managerial Perspective*, Tata McGraw Hill, First Edition, 2011.
- O’Brein & Marakas, *Management information System*, Mc Graw- Hill, Tenth Edition, 2010.

E- Resources

- <https://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf>
- <http://www.w3schools.com/erp.html/>

UCAM309 USER INTERFACE DESIGN

Semester : III
Category : Core VII
Class & Major : II B.C.A

Credit : 5
Hours/Week: 5
Total Hours : 65

Objectives:

To enable the students

- Learn the characteristics and components used in GUI.
- Analyse the requirements for designing.
- Design the web page using various tools and controls.

UNIT – I INTRODUCTION

12 Hrs

Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles.

UNIT – II DESIGN PROCESS

15 Hrs

User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu-selecting menu choice - navigating menus - graphical menus.

UNIT – III WINDOWS

15 Hrs

Windows: Characteristics-components-presentation styles – types – managements - organizations- operations -web systems - device-based controls: characteristics-Screen based controls: operate control – textboxes - selection control - combination control - custom control – presentationcontrol.

UNIT – IV WEB PAGES

12 Hrs

Text for web pages - effective feedback-guidance & assistance-Internationalization-Accessibility-Icons-Image-Multimedia-coloring.

UNIT – V USABILITY

11 Hrs

Usability- Generations of User Interfaces - Usability Engineering Life Cycle.

Text Books

- Wilbent. O. Galitz ,*The Essential Guide to User Interface Design*, John Wiley & Sons, 2007.
 - Unit I : Part 1- Chapter 1 & 2
 - Unit II : Part 2 – Step 1 to 4
 - Unit III : Part 2 – Step 5 to 7
 - Unit IV : Part 2 – Step 8 to 12
- Jacob Nielsen, *Usability Engineering*, Academic press, Third Edition, 2013.
 - Unit V : Chapter 2 to 4

Reference Books

- Ben Sheiderman, Catherine Plaisant, *Design the User Interface*, Pearson Education, 2010.

- Alan Cooper, *The Essential of User Interface Design*, Wiley – Dream Tech Ltd., 2002.

E-Resources

- <http://www.w3schools.com/userinterface.html/>
- <https://www.youtube.com/watch?v=peKy4f7Ab1M>

UCAR303 JAVA PROGRAMMING – PRACTICAL

Semester	: III	Credit	: 3
Category	: Core Practical IV	Hours/Week	: 4
Class & Major	: II BCA	Total Hours	: 52

Objectives:

To enable the students

- Create programs using Inheritance, Exception and String Handling.
- Build programs using Threads, Packages and Interfaces.
- Design simple applet programs using Swing and JDBC.

Lab Exercise

1. Constructors
2. Method Overloading
3. Method Overriding
4. Implementing Single and Multiple Inheritance concepts.
5. Implementing Thread Synchronization
6. Implementing Exception Handling.
7. Implementing String manipulation using string and string buffer classes
8. Implementing Package Concepts.
9. Implementing Interfaces Concepts.
10. Implementing Graphics using Applet.
11. Implementing Swing Concepts.
12. JDBC Connectivity

UCAM404 DATABASE MANAGEMENT SYSTEM

Semester	: IV	Credit	: 4
Category	: Core VIII	Hours/week	: 5
Class & Major	: II BCA	Total Hours	: 65

Objectives:

To enable the students

- Understand the data models and represent the database system using ER diagram.
- Create a database using SQL queries and access database using normal forms.
- Query the database using PL/SQL commands.

UNIT – I DATABASES AND DATABASE USERS**10 Hrs**

Introduction –Characteristics of the database approach –Database Actors – Advantages of using DBMS approach - Database Applications - Database System Concepts and Architecture: Data models, schemas and Instances- three schema architecture and data independence - Data Base Languages and interfaces – Database architecture.

UNIT – II DATA MODELING USING ENTITY RELATIONSHIP MODEL**15 Hrs**

Conceptual data models – Entity types, Entity sets, Attributes and key – Relationship types, Relationship sets, Roles & Structural constraints – ER diagrams. Relational model: Relational model concepts – Relational model constraints & Relational database schemas – Update operations & Dealing with constraint violations. Relational Algebra & Calculus: Unary Relational operations – Relational Algebra operations from set theory – Binary relation operations.

UNIT – III RELATIONAL DATABASE DESIGN & TRANSACTION PROCESSING CONCEPTS**15 Hrs**

Informal Design guidelines for relational schemas – Functional Dependencies – Normal forms based on primary keys – second & third Normal forms – Boyce-Codd Normal Form. Introduction – Transaction & System concepts – Characterizing schedules – Concurrency control techniques – Database Recovery concepts. Database Security & Authorization: Introduction to Database security issues – Discretionary Access control based on Granting & Revoking privileges.

UNIT – IV SCHEMA DEFINITION, BASIC CONSTRAINTS & QUERIES**13 Hrs**

SQL Data Definition – specifying Basic Constraints in SQL – Schema change statements in SQL – Basic queries in SQL – More complex SQL queries – insert, delete and update statements in SQL – Views in SQL – Embedded SQL, Dynamic SQL.

UNIT - V PL/SQL**12 Hrs**

Introduction to PL/SQL- Creating and running PL/SQL Code- Navigating the Database- Creating and Editing the source code- SQL* Plus- Running a SQL statement- Running a PL/SQL- Running a script

Text Books

- Shamkant B.Navathe, Ramez Elmasri, *Fundamentals of Database Systems*, Sixth Edition, Pearson Education, New Delhi, 2011.
 - Unit I : Chapter 1 to Chapter 2
 - Unit II : Chapter 3,4,5
 - Unit III : Chapter 8,11,12
 - Unit IV : Chapter 7

- Steven Feuerstein & Bill Pribyl, *Oracle PL/SQL programming*, Sixth Edition, O'Reilly Media, 2014.
Unit V : Chapter 1 & 2

Reference Books

- Silberschatz, Korth and Sudarshan, *Database System Concepts*, Sixth Edition, McGraw Hill, New Delhi, 2010.
- Raghu Ramakrishnan, *Database Management System*, Third Edition, Tata McGraw-Hill Publishing Company, New Delhi, 2012.

E-Resources

- <http://www.w3schools.com/dbms.html/>
- <https://www.youtube.com/watch?v=aR44FbeeFH8>
- <https://www.youtube.com/watch?v=1057YmExs>

UCAM403 OBJECT ORIENTED ANALYSIS AND DESIGN

Semester : IV
Category : Core IX
Class & Major : II BCA

Credit : 3
Hours/Week : 4
Total Hours : 52

Objectives:

To enable the students

- Understand the concepts of object oriented and designing process.
- Analyze and compare various designing patterns.
- Choose appropriate testing strategies and debugging principles.

UNIT- I INTRODUCTION

10 Hrs

An overview – Object basics – Object state and properties – Behavior – Methods - Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle.

UNIT - II UML

12 Hrs

Introduction – Survey – Rambough, Booch, Jacobson methods – Patterns – Frameworks - Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams – Dynamic modeling – Model organization – Extensibility.

UNIT - III USE CASE APPROACH

10 Hrs

Identifying Use case – Business object analysis – Use case driven object oriented analysis – Use case model – Documentation – Classification – Identifying object, relationships, attributes, methods – Super-sub class – A part of relationships Identifying attributes and methods – Object responsibility.

UNIT - IV UML DESIGN PROCESS

10 Hrs

Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface.

UNIT - V TESTING STRATEGIES

10 Hrs

Quality assurance – Testing strategies – Object orientation testing – Test cases – Test Plan – Debugging principles – Usability – Satisfaction – Usability testing – Satisfaction testing.

Text Book

- Ali Bahrami, *Object Oriented System Development*, McGraw Hill International Edition, 1999.

Reference Book

- Grady Booch, *Object Oriented Analysis and Design*, Pearson Education, 2000.

UCAM405/UCSM405 DATA COMMUNICATION NETWORKS

Semester : IV
Category : Core X
Class & Major: II BCA

Credit : 3
Hours/week : 4
Total Hours : 52

Objectives:

To enable the students

- Identify the different types of network model.
- Apply Multiplexing techniques in the Telecommunication.
- Select appropriate routing algorithm.

UNIT - I INTRODUCTION 10 Hrs

Introduction to Data Communication, Network. Protocols & standards and standards organizations - Line Configuration - Topology - Transmission node - Classification of Network OSI Model - Layers of OSI Model.

UNIT - II TRANSMISSIONS

10 Hrs

Parallel and Serial Transmission - Modems - Guided Media Unguided Media - Performance - Types of Error - Error Detection - Error Corrections.

UNIT – III MULTIPLEXING APPLICATIONS

10 Hrs

Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone systems project 802 - Ethernet - Token Bus - Token Ring FDD IEEE 802.6 - SMDS - Circuit Switching - Packet switching.

UNIT – IV LAYERS

12 Hrs

History of Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN X.25 Layers - Packet Layer Protocol - ATM - ATM Architecture - ATM Applications.

UNIT – V NETWORKS

10 Hrs

Repeaters –Bridges- Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP- SMTP - SNMP - World Wide Web- Frame relay- ATM- ATM LANs –X.25 - relay.

Text Books

- B. Forouzan, *Introduction to Data Communications in Networking*, Fourth Edition, TataMcGraw-Hill, New Delhi, 2007
Unit I : Chapter 1,2,3
Unit II : Chapter 6,7,9
Unit III : Chapter 8,12,14
Unit IV : Chapter 16,19
Unit V : Chapter 21,24,25
- William Stallings, *Data and Computer Communication*, Fifth Edition, Prentice Hall of India,2007.

Reference Books

- A. S.Tanenbaum, *Computer Networks*, Fourth Edition, Pearson Education, (Prentice hall of India Ltd), New Delhi, 2003.
- D. Bertsekas and R. Gallager, *Data Networks*, Prentice hall of India, New Delhi,1992.
- Lamarca, *Communication Networks*, Tata McGraw Hill, New Delhi, 2002.

E-Resources

- <http://www.w3schools.com/dcn.html/>
- <http://freevideolectures.com/Course/2278/Data-Communication>

UCAM406 DATA MINING AND WAREHOUSING

Semester : IV

Category : Core XI

Class & Major: II BCA

Credit : 3

Hours/Week : 4

Total Hours : 52

Objectives:

To enable the students

- Understand the Data Preprocessing Techniques.
- Analyse the various algorithms in Data Mining.
- Extract the data using classification and cluster algorithms in the research field.

UNIT - IDATA MINING & PREPROCESSING

12 Hrs

Data mining: introduction – Kinds of Data & Pattern – Technologies – Application – Major Issues in Data Mining - Data Mining Applications. Data Preprocessing: Overview - Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data Discretization.

UNIT - II DATA WAREHOUSING**10 Hrs**

Data Warehouse - Data Warehouse Modeling - Data Warehouse Design and Usage - Data Warehouse Implementation - Data Generalization by Attribute-Oriented Induction

UNIT - III CLASSIFICATION**10 Hrs**

Basic Concepts - Decision Tree Induction - Bayes Classification Methods - Rule-Based Classification - Model Evaluation and Selection - Techniques to Improve Classification Accuracy Bayesian Belief Networks

UNIT - IV CLUSTER ANALYSIS**10 Hrs**

Cluster Analysis - Partitioning Methods - Hierarchical Methods - Density-Based Methods - Grid-Based Methods - Evaluation of Clustering - Probabilistic Model-Based Clustering

UNIT - V OUTLIER DETECTION**10 Hrs**

Outliers and Outlier Analysis - Outlier Detection Methods - Statistical Approaches - Proximity-Based Approaches - Clustering-Based Approaches - Classification-Based Approaches

Text Books

- Jiawei Han and Micheline Kamber, *Data Mining Concepts and Techniques*, Third Edition, Elsevier, Morgan Kaufmann Publishers, 2012.
 - Unit I : Chapter 1 & 3
 - Unit II : Chapter 4
 - Unit III : Chapter 8 & 9
 - Unit IV : Chapter 10 & 11
 - Unit V : Chapter 12
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining*, Fourth Edition, Pearson Education, 2014.

Reference Book

- Aler Berson, Stephen J. Smith, *Data Warehousing Data Mining OLAP*, Tata McGraw Hill Publications, 2001

E-Resources

- <http://www.w3schools.com/datamining.html/>
- <https://www.youtube.com/watch?v=dGDuD10U4-M>

UCAR402 DATABASE MANAGEMENT SYSTEM – PRACTICAL

Semester	: IV	Credit	: 3
Category	: Core Practical V	Hours/week	: 3
Class & Major	: II BCA	Total Hours	: 39

Objectives:**To enable the students**

- Develop practical skills on various queries, views, indexes, triggers in SQL.

- Design the database for different applications using Oracle.
- Implement the Procedures and functions in PL/SQL to access the database.

Lab Exercise

39 Hrs

1. Create a Student_Information and Mark _Details data bases using DDL, DML, TCL and DCL.
2. Create a Library data base and perform the Aggregate Function & SET Operations.
3. Create a Hospital data base and perform the Inner and Outer Joins Operations.
4. Create Bank database and query it using group by having and order by.
5. Create Employee database and query it using sub queries.
6. Create Views and indexes for the Phone Directory database.
7. Create PL/SQL Block for Mark sheet processing.
8. Create the Procedures for Stock management data base.
9. Create the Functions for Real estate data base.
10. Create different types of triggers for Event Management database.

Note: All the tables should be created with Constraints.

UCAR403 CASE TOOLS LAB

Semester : IV
Category : Core Practical VI
Class & Major : II BCA

Credit : 3
Hours/Week : 3
Total Hours : 39

Objectives:

To enable the students

- Gain practical skills on UML techniques.
- Develop their creativity in designing the projects, to analyse the problem and to provide solution to the problem.

Lab Exercise

Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.

1. Program Analysis and Project Planning.
Thorough study of the problem – Identify project scope – Objectives –Infrastructure.
2. Software requirement Analysis
Describe the individual Phases / Modules of the project – Identify Deliverables.
3. Data Modeling
Use work products – Data dictionary – Use diagrams and activity diagrams - build and test class diagrams – Sequence diagrams and add Interface to class diagrams.
4. Software Developments and Debugging
5. Software Testing
Prepare test plan – perform validation testing – Coverage analysis –Memory leaks – develop test case hierarchy – Site check and Site Monitor.

Suggested List of Applications

1. Student Marks Analyzing System
2. Quiz System
3. Online Ticket Reservation System
4. Payroll System
5. Course Registration System
6. Expert Systems
7. ATM Systems

UCAE305 INTERNET APPLICATIONS

Semester : III
Category : NME
Class & Major : II UG

Credits : 2
Hours/Week: 4P
Total Hours : 52

Objectives:

To enable the students

- Understand the various HTML tags.
- Design web pages using CSS and Multimedia.

Lab Exercise

1. Develop a webpage to illustrate body and pre tags.
2. Develop a webpage to illustrate text font tag.
3. Develop a program to illustrate comment, h1...h6, and div tag.
4. Develop a program to illustrate Ordered List tag.
5. Develop a program to illustrate Unordered List tag.
6. Develop a program to illustrate Nested and Definition tag.
7. Develop a program to illustrate Img tag.
8. Develop a program to illustrate span tag.
9. Develop a program to illustrate CSS (cascading style sheet).
10. Develop a program to illustrate Embedded Multimedia.

UCAE306 WEB TOOLS

Semester : III
Category : NME
Class & Major : II UG

Credits : 2
Hours/Week : 4P
Total/Hours : 52

Objectives:

To enable the students

- Learn the tags of HTML and Scripting Language.
- Apply the SCRIPT element and CSS for creating dynamic web pages.

HTML

1. Create an HTML Documents, and establish adequate formatting for presentation purposes
2. Managing images in HTML document.

3. Insert and manipulate tables
4. Establish and maintain internal and external link to available resources
5. Frames
6. Forms
7. Special Effects in HTML Documents(eg: Marquee)

CASCADING STYLE SHEET

1. CSS Background
2. CSS text and fonts
3. CSS Links
4. CSS Lists
5. CSS tables

JAVASCRIPT

1. Basic Syntax.
2. Control Structures.
3. Writing Functions.
4. Working with Arrays.
5. Events Handling.

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
III	III	Core V	UCAM307	Java Programming	Program Writing	Debugging
	III	Core VI	UCAM308	MIS and ERP	Poster presentation	Case study
	III	Core VII	UCAM309	User Interface Design	Designing	System Modeling
	III	Core Practical IV	UCAR303	Java Programming - Practical	DPA	Viva Voce
IV	III	Core VIII	UCAM404	Database Management System	ER Diagrams	Queries
	III	Core IX	UCAM403	Object Oriented Analysis & Design	System Modeling	Seminar
	III	Core X	UCAM405/ UCSM405	Data Communication Networks	Working Model	Seminar
	III	Core XI	UCAM406	Data Mining and Warehousing	Case study	Seminar
	III	Core Practical V	UCAR402	Database Management System –Practical	DPA	Viva Voce
	III	Core Practical VI	UCAR403	Case Tools Lab	DPA	Viva Voce

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
III	IV	NME	UCAE305	Internet Applications	DPA	Viva Voce
			UCAE306	Web Tools	DPA	Viva Voce

COURSE PROFILE MCA

Semester	Category	Course Code	Course Title	Contact Hrs / Week	Credit	
					Min	Max
I	Core I	PCAM103	Mathematical Foundation	4	3	3
	Core II	PCAM108	Marketing Management	5	3	3
	Core III	PCAM110	C Programming	5	4	4
	Core IV	PCAM111	Web user Interface design	4	3	3
	Core Practical I	PCAR105	C Programming –Practical	3	2	2
	Core Practical II	PCAR106	Web user interface design-Practical	3	2	2
	Core		Library	1	-	-
	Non Major Elective I			5	4	4
Total				30	21	21
II	Core V	PCAM205	Database Management System	5	4	4
	Core VI	PCAM206	Applied Statistics	5	4	4
	Core VII	PCAM207	Object Oriented Programming using C++	4	4	4
	Core VIII	PCAM208	Data Structures and Algorithms	4	3	3
	Core Practical III	PCAR203	Database Management System-Practical	3	2	2
	Core Practical IV	PCAR204	Object Oriented Programming using C++ -Practical	3	2	2
	Core		Library	1	-	-
	Non Major Elective I	PALE201/ PALE301	Preparatory Course for NET/SET	5	4	4
	Service Learning	PCSX201/ PCAX201	Introduction To Information Technology	-	1	1
Total				30	24	24
III	Core IX	PCAM312/ PCAR312	Computerized Accounting	5	4	4
	Core X	PCAM308	Java Programming	5	4	4
	Core XI	PCAM309	Visual Programming and Web Hosting	6	4	4
	Core XII	PCAM311	Operating System	5	4	4
	Core Practical V	PCAR304	Visual programming-Practical	3	2	2
	Core Practical VI	PCAR305	Java Programming-Practical	3	2	2
	Core		Library	1	-	-
	Value Education	PWSV301	Gender Studies	2	1	1
Total				30	21	21

IV	Core XIII	PCAM406	Human Resource Management	4	4	4
	Core XIV	PCAM407	Cloud Computing	4	4	4
	Core XV	PCAM408	Unified modeling Techniques	4	4	4
	Core XVI	PCAM410	Web Technology	5	4	4
	Core XVII	PCAM411	Principles of Compiler Design	4	3	3
	Core Practical VII	PCAR405	UML LAB	3	2	2
	Core Practical VIII	PCAR406	Web Technology -Practical	3	2	2
	Core		Library	1	-	-
	Value education	PWSV402	Women's Studies	2	1	1
Total				30	24	24
V	Core XVIII	PCAM512	Android Programming	6	5	5
	Core XIX	PCAM507	Data Mining and Warehousing	5	4	4
	Core XX	PCAM511	Digital Image Processing	5	5	5
	Core XXI	PCAM509	Operation Research	4	4	4
	Core XXII	PCAM510	Software Engineering	4	3	3
	Core Practical IX	PCAR504	Android programming - Practical	3	2	2
	Core Practical X	PCAR505	Mini project	2	2	2
	Core		Library	1	-	-
Total				30	25	25
VI	Core Project I	PCAP601	Project work	30	20	20
Grand Total				180	135	135

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Contact/Week	Credit	
					Min	Max
III	Extra Credit	PCAS301	Working Model/ Self Study Paper	-	1	1
IV	Extra Credit	PUSI401	Summer Internship	-	1	1
V	Extra Credit	PCAS501	Application Development/ Paper Presentation	-	1	1

PCAM308 JAVA PROGRAMMING

Semester : III
Category : Core X
Class & Major :II MCA

Credit : 4
Hours/Week : 5
Total Hours : 65

Objectives:

To enable the students

- Develop the students to write programs in Java Application and Applets.
- Understand the web oriented programming using servlet, JSP and Java Beans.

UNIT – I INTRODUCTION

10 Hrs

Classes and objects- Inheritance - Packages and Interfaces – Exception Handling – overloading methods – method overriding.

UNIT – II APPLET & AWT

15 Hrs

Multithreaded Programming- Synchronization – Applets class – AWT classes – Windows fundamentals – Frame windows – Working with graphics – AWT controls – Layout Managers.

UNIT – III DATABASE ACCESS

10 Hrs

Creating a Web Page from a Database Query – Connection Pooling – Getting the Column number right – The JDBC- ODBC Bridge – Registering a JDBC Driver – Using a Prepared statement – Handling Transactions with Commit and Rollback – Using Database MetaData for Generic code – Analyzing the columns in a ResultSet – Detecting Null data – Creating HTTP sessions.

UNIT – IV JAVA SERVER PAGES

15 Hrs

Expressions – Scriptlets – Implicit Objects – Declarations –Comments – Including files – Forwarding Requests – The page Directive – Using Java Beans with JSP.

UNIT – V JAVABEANS

15 Hrs

What is Java Beans – Advantages of Java Beans – Application Builder Tools – BDk – JAR Files – Introspection – Developing a simple bean – Using bound properties.

Text Books

- Herbert Schildt, *The Java Complete Reference*,
- Phil Hanna, *Instant Java Servlets*, Fourth Edition, Tata McGraw Hill, New Delhi, 2000.

Reference Books

- Deitel AND Deitel , *Java How to program* , 4th Edition, Prentice Hall , 2000.
- Gary Cornell and Cay S. Horstmann, *Core Java Vol 1 and Vol 2*, Sun Microsystems Press, 1999.

PCAM309 VISUAL PROGRAMMING AND WEB HOSTING

Semester : III
Category : Core XI
Class & Major :II MCA

Credit : 4
Hours/Week : 6
Total Hours : 78

Objectives:

To enable the students

- The students will be able to design the visual basic project.
- Develop creativity in designing the project.
- Make the students to analyze the problem.
- Developing the students to design the model of the project.

UNIT – I INTRODUCTION

15 Hrs

Customizing a Form – Command Buttons – Image Controls – Text Boxes – Labels – Message Boxes – Variables – Data Types – Conditionals Statements – Looping Statements.

UNIT – II ARRAYS & FUNCTIONS

15 Hrs

Built– in Functions – Functions and Procedures – Control Arrays – Combo Boxes – List Boxes – Rich Textbox – Flex Grid Control – Dialog Boxes – Menus – MDI Forms – Working with ADO – Active X Controls.

UNIT – III .NET INTRODUCTION

16 Hrs

Architecture of Microsoft.NET – New features in .NET 3.5 – keyword – Data Types – Operators – Variables – Constants – Data Type Conversion – Arrays – Enumerations – Structures – Conditional – Looping Statements – Exception handling.

UNIT – IV CONTROLS

16 Hrs

Interacting with Controls: Label – Textbox – Rich Textbox – Button – List box – Checkbox – Radio Button – Group box – Panel – CheckedList Box – Combo Box – List View – Picture Box – Tab – ImageList – Timer – ProgressBar – Status Bar.

UNIT – V WEB HOSTING

16 Hrs

Introduction to Web Hosting – Types of Web Hosting – Web Hosting Providers – Host Domains –Host Technologies- Host Database - Web hosting Services.

Text Books

- Andrew Parsons, Nick Randolph, *Professional Visual Studio 2005*, Wrox publications, Fourth Edition, Wilky India, 2007.
- *Visual studio 2005 Programming Black Book*, Fifth Edition, Kogent Learning Solutions Inc, 2008

Reference Books

- Matthew Drovín, *Web Hosting and Website Development*, First Edition, A Guide to Opportunities.2007.
- Brian siler and Jeff sports., *Using Visual Basic 6*, Fifth Edition, New Delhi, Prentice Hall India, 2002.
- Pappar and Murray., *Visual C++: The Complete Reference*, Second Edition, New Delhi, Tata McGraw Hill, 2000.
- Viker Gupta , *Comdex . NET Programming*, New Edition, Dreamtech press. 2001
- Gary Cornell., *Visual Basic 6 from the Ground up*, Second Edition, Tata McGraw Hill, 1999.

PCAM311 OPERATING SYSTEM

Semester : III
Category : Core XII
Class &Major: II MCA

Credit : 4
Hours/week : 5
Total Hours : 65

Objectives:

To enable the students

- Define the process and memory management in OS.
- Analyse the various algorithms in CPU Scheduling.
- Apply the scheduling algorithms to avoid deadlock in LINUX OS.

UNIT – I INTRODUCTION

10 Hrs

Definition of OS- Types of computer system- Computer system structures: I/O structure- Storage Structure – Operating System Structure: System Components – Services – System Calls – System programs – System Design and Implementation.

UNIT – II PROCESS MANAGEMENT

12 Hrs

Process Concepts–Process Scheduling–Operating on process–co-operating processes – Inter Process communications CPU scheduling – Multithreading Models – Threading issues – Overview - Multithreading Models.

UNIT – III CPU SCHEDULING AND PROCESS SYNCHRONIZATION

15 Hrs

Scheduling Concepts - Criteria–Scheduling algorithm–Multiple-processor scheduling- Real time scheduling–Algorithm Evaluation – Process synchronization: Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – System model.

UNIT – IV DEADLOCKS AND MEMORY MANAGEMENT

13 Hrs

Characterization–Deadlock characterization – Methods for handling deadlocks- Deadlock Prevention–Avoidance– Detection –Deadlock Recovery- Memory management: Swapping –

Paging – Segmentation-Segmentation with paging- Demand paging–Page replacement– Thrashing.

UNIT – V FILE SYSTEM INTERFACE AND LINUX

15 Hrs

File Concept – Access Methods – Directory Structure - Allocation methods – Free-space management– Disk scheduling – Disk management – Swap-space management – RAID Structure- Linux: History- Design Principles – Kernel Modules – Process management – Scheduling – Memory Management- File systems – Security.

Text Book

- Silberschatz, Galvin and Gagne, *Operating System Concepts*, John Wiley & Sons Inc, Sixth Edition, 2003.
 - Unit I : Chapter 1,2,3
 - Unit II : Chapter 4,5
 - Unit III : Chapter 6,7
 - Unit IV : Chapter 8,9,10
 - Unit V : Chapter 11, 12, 20

Reference Books

- Andrew S. Tanenbaum, *Operating system Design and Implementation*, PHI,2005.
- Milan Milankovic, *Operating System*, McGraw Hill,2003.
- H M Deital, P J Deital and D R Choffnes, *Operating Systems*, Pearson Education, 2004.
- Sumitabha Dos, *UNIX concepts and applications*, 4th edition, Mc-Graw Hill, 2006.

E-Resources

- <http://www.w3schools.com/operatingsystem.html/>
- <https://www.youtube.com/watch?v=7r3Vln4bGLk>
- <https://www.youtube.com/watch?v=6TxXA3hbX8Y>
- <https://www.youtube.com/watch?v=y9C4EAqHxvI>

PCAR304 VISUAL PROGRAMMING - PRACTICAL

Semester : III
Category : Core Practical V
Class & Major: II MCA

Credit : 2
Hours/Week : 3
Total Hours : 39

Objectives:

To enable the students

- It helps the student to acquire knowledge practical skills on visual programming.
- Enable students to design and code visual programs.
- Develop their creativity in designing the project and to analyze the problem and to provide solution to the problem

Lab Exercise

1. Develop VB application using Multiple Forms
2. Develop VB application for Creating Menus
3. Develop VB Application with Data Control
4. Develop VB Application with Dialog Box
5. Working with Intrinsic Controls
6. Creating Active X Controls
7. Develop VB application for Payroll processing
8. Develop VB.NET Application for Inventory System
9. Develop VB.NET Application for Mark sheet Processing.
10. Develop VB.NET Application using Data Grid view Control.

PCAR305 JAVA PROGRAMMING – PRACTICAL

Semester : III
Category : Core Practical VI
Class & Major : II MCA

Credit : 2
Hours/Week : 3
Total Hours : 39

Objectives:

To enable the students

- Enable the students to develop Java Application program and Applet program.
- Help the student to acquire practical knowledge on Advanced Java programming.
- Enable the students to have deep knowledge in the network programming on Java Bean, Servlets.

Lab Exercise

1. Program to illustrate the use of overloading and overriding.
2. Program to implement the concept of Interfaces and packages.
3. Generate the program using exceptions handling mechanism.
4. Application using synchronization such as Thread based class
5. Implement the file operations.
6. Program using Applets and AWT.
7. Write a Servlet to display IP address and port number of a server
8. Create a Servlet program using JDBC connection.
9. Write a Servlet program to keep track previous request in session concept.
10. Create a JSP page using Session Java beans.

PCAM407 CLOUD COMPUTING

Semester : IV
Category : Core XIV
Class & Major: II MCA

Credit : 4
Hours/week : 4
Total Hours : 52

Objectives

To enable the students

- To inculcate the knowledge of cloud computing techniques, best practices in cloud computing.
- To understand the current challenges in cloud computing.
- To design and implement cloud-based applications.

UNIT – I UNDERSTANDING CLOUD COMPUTING 10 Hrs

Cloud Computing – History of Cloud Computing – Cloud Architecture -Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services- Types of Cloud Service Development – Software as a Service – Platform as a Service – Infrastructure as a service-Database as a service.

UNIT - II CLOUD COMPUTING TECHNOLOGIES 10 Hrs

Hardware and Infrastructure: Clients, Security, Network, services-Accessing the Clouds: Platforms, WEB applications, WEB APIS, WB Browsers-Cloud Storage: Overview, Storage provides, Cloud Standards: Applications, Client, Infrastructure,-Services

UNIT - III CLOUD COMPUTING APPLICATIONS 10 Hrs

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

UNIT - IV VIRTUALIZATION & CLOUD SECURITY 10 Hrs

Virtualization characteristics, Managing virtualization, Virtualization in cloud,Virtualization desktop and managing desktops in the cloud and security issues- Storage basics, Storage as a service providers, security, aspects of data security, data security mitigation, provider data and it's security.

UNIT - V USING CLOUD SERVICES 12 Hrs

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management –Collaborating on Event Management – Collaborating on Contact Management –Collaborating on Project Management – Collaborating on Word Processing -Collaborating on Databases – Storing and Sharing Files.

Text Books

- Michael Miller, “*Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*”, Que Publishing, 2008.
- Judith Hurwitz , Bloor Robin, Marcia Kaufman & Fern Halper, “*Cloud Computing for Dummies*” , Wiley India Edition ,2009.

Reference Books

- Haley Beard, “*Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs*”, Emereo Pty Limited, 2008.
- Anthony T Velte, Toby J Velte, Robert Elsenpeter ,” *Cloud Computing a practical approach*”,Tata McGraw-HILL,2010.

PCAM408 UNIFIED MODELING TECHNIQUES

Semester : IV	Credits : 4
Category : Core XV	Hours/Week : 4
Class &Major: II MCA	Total Hours : 52

Objectives:

To enable the Students

- To specify, visualize, construct and document the artifacts of a software systems.
- Development and methodologies of UML.
- Apply the testing strategies in various applications.

UNIT – I UML CONCEPTS 10 Hrs

Introduction to UML – Basic Structural Modeling: Classes –Relationships-Common Mechanism – Diagrams – Class diagrams.

UNIT – II ADVANCED STRUCTURAL MODELING 10 Hrs

Advance classes – Advance relationships – Interfaces - Types and Roles – Packages – Instances – Object diagrams.

UNIT – III BASIC BEHAVIORAL MODELING 10 Hrs

Basic Behavioral Modeling – Interactions – Use Cases –Use Case diagrams- Interaction Diagrams – Activity diagram

UNIT – IV ADVANCED BEHAVIORAL MODELING 12 Hrs

Events and Signal – State machines – Process and Threads – Time and Space – State chart diagrams.Architectural Modeling – Components –Deployment –Collaborations Patterns and frame works – Deployment diagrams – Systems and Models -Rational Unified Process.

UNIT – V THE UNIFIED PROCESS

10 Hrs

The four P's (People, Project, Product and Process in Software development) –Use Case driven process –An Architecture -Centric Process – An Iterative and Incremental Process.

Text Book

- Grady Booch, James Rumbaugh and Ivar Jacobson, *The Unified Modeling Language User Guide*, Addison – Wesley Longman Pvt.Ltd., Singapore, 2001.

Reference Books

- Ali Bahrami, *Object Oriented System Development*, McGraw Hill International Edition,1999.
- Grady Booch, *Object Oriented Analysis and Design*, Pearson Education, 2/e, 2000.

PCAM410 WEB TECHNOLOGY

Semester : IV

Category : Core XVI

Class &Major : II MCA

Credit : 4

Hours/Week : 5

Total Hours : 65

Objectives:

To enable the students

- Understand the Dot.Net framework.
- Build applications using ASP.Net.
- Develop web applications and connect it to the database using ADO.NET.

UNIT –I C# PROGRAMMING

14 Hrs

The Philosophy of .NET: An Overview of .NET Assemblies - Understanding the Common Type System, Common Language Specification, Common Language Runtime - The Platform-Independent Nature of .NET - The System.Console Class - System Data Types and C# Keywords - Working with String Data - C# Iteration Constructs - Decision Constructs and the Relational/Equality Operators - Methods and Parameter Modifiers - C# Arrays, the enum Type, the Structure Type, Value Types and Reference Types, C# Nullable Types.

UNIT – II PILLAR OF OOP'S

15 Hrs

The first Pillar of OOP: Encapsulation - The Second Pillar of OOP: The Details of Inheritance - Programming for Containment/Delegation - The Third Pillar of OOP: C#'s Polymorphic Support - Understanding Base Class/Derived Class Casting Rules - The Master Parent Class: System.Object - Understanding Structured Exception Handling.

UNIT – III ADO.NET

16 Hrs

Definition of ADO.NET - ADO.NET Data Providers - ADO.NET Namespaces - Abstracting Data Providers Using Interfaces - Creating the AutoLot Database - The ADO.NET Data Provider Factory Model - the Connected Layer of ADO.NET - Working with Data Readers - Database Transactions - Disconnected Layer of ADO.NET - Role of the DataSet - Working with DataColumn, DataRow, DataTable & Data Adapters - The Entity Framework. Understanding the Role of Entity Framework-Building and Analyzing Your First EDM-

Programming Against the Conceptual Model-AutoLotDAL Version Four, Now with Entities-Data Binding Entities to Windows Forms GUIs-Going Forward with .NET Data-Access APIs.

UNIT – IV ASP.NET

10 Hrs

Visual Studio – Designing a Web Page – Exploring the Anatomy of a web Form – Essentials of HTML – Writing Code – Debugging – Web Form Fundamentals – Web Controls – Error Handling, Logging and Tracking – State Management – Validation Controls – Rich Controls.

UNIT – V MASTER PAGES & THEMES

10 Hrs

User Controls and Graphics - Styles, Themes, and Master Pages - Website Navigation - ADO.NET Fundamentals - Data Binding - The Data Controls.

Text Books

- Andrew Troelsen, *Pro C# 5.0 and the .NET 4.5 Framework*, Sixth Edition, Apress, New York, 2012.
 - Unit I : Chapter 1, 2, 3, 4
 - Unit II : Chapter 5, 6, 7
 - Unit III : Chapter 21, 22, 23
- Matthew MacDonald, *Beginning ASP.NET 4.5 in C#*, Apress, New York, 2012.
 - Unit IV : Chapter 4, 5, 6, 7, 8, 9, 10
 - Unit V : Chapter 11, 12, 13, 14, 15, 16

Reference Books

- *.NET 4.5 Programming 6-in-1, Black Book*, DreamTech Press Kogent solutions, 2012
- A.P.Rajshekhhar, *.NET Framework 4.5 Expert Programming Cookbook*, Packt Publication, 2013

E-Resources

- <http://www.w3schools.com/web.html/>
- https://www.youtube.com/watch?v= bFdP3_TF7Ks
- <https://www.youtube.com/watch?v= aoFDyt8oG0k>

PCAM411 PRINCIPLES OF COMPILER DESIGN

Semester : IV
Category : Core XVII
Class &Major : II MCA

Credit : 3
Hours/Week : 4
Total Hours : 52

Objectives:

To enable the students

- Study the principles of finite automata.
- Analyse the various algorithms in storage allocation techniques.
- Apply DFA and NFA in automata to produce the optimum results.

UNIT – I INTRODUCTION TO COMPILERS **10 Hrs**

Compilers – Analysis of source program – The Phases of compilers – Cousins of Compilers – The grouping of phases A simple one-pass compiler Overview – Syntax Definition – Syntax-directed translation – Parsing – Lexical analysis.

UNIT – II SYMBOL TABLE **12 Hrs**

The role of lexical analyzer – Finite Automata – DFA – Conversion of an NFA into a DFA – Conversion of an NFA to a Regular Expression - From a regular expression to an NFA – Design of a Lexical Analyzer Generator – Optimization of DFA – based pattern matchers.

UNIT - III SYNTAX ANALYSIS **10 Hrs**

The role of a parser – Context Free Grammar – Top-down parsing – Bottom-up parsing – Operator – LR Parsers – Precedence parsing. Syntax-directed translation: Syntax – directed definitions – Construction of Syntax trees – Bottom-up evaluation of S-attributed definitions – Top-down translation – Recursive evaluators

UNIT - IV TYPE CHECKING **10 Hrs**

Type system – Specification of a simple Type Checker – Type conversions – An algorithm for unification. Run-time environments-Storage Organization-Storage -Allocation Strategies – Symbol Tables – Dynamic Storage allocation techniques.

UNIT –V INTERMEDIATE CODE GENERATION **10 Hrs**

Intermediate languages – Declarations – Back patching – Procedure Calls. Code Generation: A simple code generator – the Dag representation of basic blocks – Peephole optimization – Code Generator generators. Code Optimization: Introduction – Principal sources of optimization – Optimization of basic blocks.

Text Book

- Alfred V.Aho, Ravi Sethi, Jeffery D.Ullman, *Compilers, Principles and Techniques and Tools*, Addison-Wesley, New Delhi, 1999.
Unit I : Chapter 1, 2
Unit II : Chapter 3
Unit III : Chapter 4, 5
Unit IV : Chapter 6, 7
Unit V : Chapter 8, 9, 10

Reference Books

- Chattopadhyay Santanu, *Compiler Design*, PHI, New Delhi, 2006.
- Holub Allen, *Compilers in C*, PHI, New Delhi, 1997.

E-Resources

- <http://www.w3schools.com/compilers.html/>
- <https://www.youtube.com/watch?v=j3SCUBsZm4A>
- <https://www.youtube.com/watch?v=7r3Vln4bGLk>

PCAR405 UML LAB

Semester : IV
Category : Core Practical VII
Class & Major : II MCA

Credits : 2
Hours/Week : 3
Total Hours : 39

Objectives:

To enable the students

- Acquire practical skills on various tools in UML Language.
- Analyze and test the project using UML diagrams.
- Design the project and provide solution to the applications.

Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.

1. Program Analysis and Project Planning.

Thorough study of the problem – Identify project scope – Objectives –Infrastructure.

2. Software requirement Analysis

Describe the individual Phases / Modules of the project – Identify Deliverables.

3. Data Modeling

Use work products – Data dictionary – Use diagrams and activity Diagrams build and test class diagrams – Sequence diagrams and add Interface to class diagrams.

4. Software Developments and Debugging

5. Software Testing

Prepare test plan – perform validation testing – Coverage analysis – Memory leaks – develop test case hierarchy – Site check and Site Monitor.

Suggested List of Applications

1. Student Marks Analyzing System
2. Quiz System
3. Online Ticket Reservation System
4. Payroll System
5. Course Registration System
6. Online Shopping
7. ATM Systems
8. Stock Maintenance system
9. Library Management System
10. Remote Monitoring System

PCAR406 WEB TECHNOLOGY – PRACTICAL

Semester : IV
Category : Core Practical VIII
Class &Major : II MCA

Credit : 2
Hours/Week : 3
Total Hours : 39

Objectives:

To enable the students

- Acquire practical skills in C# programming and Server Side Scripting.
- Develop Web Applications using ADO.NET.

Lab Exercise

1. Programs to implement Encapsulation, Inheritance and Polymorphism.
2. Programs to implement Abstract Class using Inheritance.
3. Programs to implement File Handling and User Defined Exception.
4. Programs to implement String Handling
5. Developing Window Forms using C#
6. Using ADO.Net to handle data, Connecting to a database, firing queries to display Data
7. Online Banking System using .NET Controls
8. Online College Management System using Navigation Controls
9. Online Appointment Booking System
10. Data Controls

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core X	PCAM308	Java Programming	Problem Solving	Debugging
	Core XI	PCAM309	Visual Programming and Web Hosting	Problem Solving	Application Development
	Core XII	PCAM311	Operating System	Problem Solving	Working Model
	Core Practical V	PCAR304	Visual programming-Practical	DPA	Viva voce
	Core Practical VI	PCAR305	Java Programming-Practical	DPA	Viva Voce
IV	Core XIV	PCAM407	Cloud Computing	Working Model	Poster Presentation
	Core XV	PCAM408	Unified modeling Techniques	System Modeling	Seminar
	Core XVI	PCAM410	Web Technology	Problem Solving	Web Designing
	Core XVII	PCAM411	Principles of Compiler Design	Problem Solving	Seminar
	Core Practical VII	PCAR405	UML LAB	DPA	Viva voce
	Core Practical VIII	PCAR406	Web Technology - Practical	DPA	Viva Voce

INTERNAL QUALITY ASSURANCE CELL
PWSV301 GENDER STUDIES

Semester	: III	Credit	: 1
Category	: Value Education	Hours/Week	: 2
Class & Major	: II PG	Total Hours	: 26

Objectives:

To enable the students

- Understand the origin, growth and concepts of women's studies.
- Analyse gender inequalities and discriminations in the society and possible initiatives to overcome.

UNIT - I INTRODUCTION TO WOMEN'S STUDIES **4 Hrs**

Objectives and scope –Meaning - UGC's Initiatives and Progress of Women's Studies in India since 1989 - women's studies abroad.

UNIT - II CONCEPTS IN WOMEN'S STUDIES **5 Hrs**

Gender and Sex- Patriarchy- Gender Socialization - Gender Stereotyping- Gender Discrimination- Gender Equality and Equity- Biological Determinism – Feminism- types and waves of Feminism- Gender and Work- strategic gender need - practical gender need - Gender Mainstreaming - Gender Budgeting and Gender Auditing.

UNIT - III FORMS OF INEQUALITIES **5 Hrs**

Various forms of Gender Inequalities-Mortality inequality- Natality inequality -Basic facility inequality- Special opportunity Professional inequality- Ownership inequality- Household Inequality- Strategies and interventions to overcome the inequalities - adolescences girls - role of social media - guiding and misguiding media.

UNIT - IV INSTITUTIONS LEGITAMISE GENDER INEQUALITIES IN THE SOCIETY **6 Hrs**

Family - Community-Culture- Educational Institutions - Media - State - constitutions - Law - Market-Politics Religion- Caste- Class Epics and literature- traditions, customs - Patriarchy and Capitalism, economic and social policies of the nation.

UNIT - V STATE INITIATIVES **6 Hrs**

International and national Initiatives to address Gender discrimination - Convention on Elimination of All forms of Discrimination [CEDAW] - national policies for women empowerment in 2001 - Human Development Index (HDI)- Gender Development Index (GDI)- Gender Empowerment Measure (GEM) - UN initiatives - UN Women and its Role in ensuring Gender Equality.

Reference Books

- Bullock.S, *Women and work*, Zed Books, London, 2004.
- Mies.Mand Shiva.V, *EvoFeminism, Kali for women*, New Delhi, 2005.
- Aryasadhana, *Women, Gender, Equality and the state*, Deep and Deep Publications, New Delhi, 2006.

PWSV402 WOMEN'S STUDIES

Semester	: IV	Credit	: 1
Category	: Value Education	Hours/Week	: 2
Class & Major	: II PG	Total Hours	: 26

Objectives:

To enable the students

- Understand the economic, social and legal empowerment programmes for women in India.
- Realize the role of women and health issues.

UNIT - I STATUS OF WOMEN AND CONTRIBUTIONS OF WOMEN'S MOVEMENTS 4 Hrs

Women in Historical Perspective- Issues and challenges of women during British Era- colonial - Social Reforms Movements and Women's Movements- their contributions to Women Empowerment - towards equality report 1974.

UNIT - II APPROACHES TO WOMEN EMPOWERMENT 5 Hrs

Women Empowerment - Approaches - WID - WAD - GAD- Provisions for Political Participation in the Constitution- Economic Empowerment through Entrepreneurship and Skill Training - Skill training Programmes for adolescent Girls, Women, Differently Abled

UNIT - III WOMEN EDUCATION AND HEALTH 6 Hrs

Challenges of women in higher education – initiatives - General Health Issues faced by Women in India- Maternal and Child Health – Maternal Mortality, Neo Natal Mortality- Abortions- Contraception- Role and provision of National Rural Health Mission – Sanitation and Health- Menstrual Hygiene Management- Gender issues in Health.

UNIT - IV GENDER BASED VIOLENCE 5 Hrs

Forms of Crimes Against women- Gender Based Violence from Womb to Tomb- Female Infancies - feticide- cultural violence – new forms of crimes- cyber crimes- stalking- Eve-teasing- sexual harassment at work places – Acid Attacks, Honor Crimes - Increasing Crimes against women as manifestation of gender discrimination

UNIT - V LEGAL AND PROTECTIVE MEASURES FOR WOMEN 6 Hrs

Constitutional guarantee on gender equality- PCPNDT Act - Laws Exclusively for Women - Dowry Prohibition- Prevention of Domestic violence- Preventing sexual harassment at work places- Criminal law amendment - Child abuse and Child Rights Protecting of Children from Sexual Offences Act 2012 - eloping – teenage issues - short stay homes - crisis center - women associations.

Reference Books

- Sathyavathi Manuel, *The Personal Laws of Women in India*, C.Sitraman and Co, Chennai, 2004.
- Antony. M.J., *Women's Rights*, Hind Pocket Books (p-ltd, New Delhi).
- Behraman.J and Deoalikal.A, *Health and Nutrition, Hand Book of Development Economics*, North Hoolan d, Amsterdam, 2007.
- Swaminathan.M, *the Handbook of Food and Nutrition*, the Bangalore Press, Bangalore 2012.

I, II & III Evaluation Components of CIA for Gender & Women's Studies

Component I & II - 30+30 Marks

(Compulsorily two components from the given options)

- Poster Presentation
- Album making
- Seminar
- Assignment

Component III - 40 Marks

(Mandatory)

- Field survey report

I. PASSING MINIMUM FOR ESE (with effect from 2016-2017)

- Passing minimum for UG course is 40% in ESE and 40% in the aggregate of CIA and ESE.
- Passing minimum for PG course is 50% of marks in ESE and 50% in the aggregate of CIA and ESE.

II. Revised Guidelines for Supplementary Examinations (with effect from – November 2015)

Theory Courses / Practical Courses / Comprehensive Viva-voce / Project Viva-Voce / Value Education / Soft Skill Courses / E0xtension (UG & PG).

ESE – November:

- Students with arrear /absent in theory / practical / theory cum practical / project courses of Semesters I, III &V are eligible to appear in ESE - November.

ESE – April:

- Students with arrear / absent in theory / practical / theory cum practical / Project/ Comprehensive viva voce courses of semesters II, IV & VI are eligible to appear in ESE-April.
- Final year students with arrear /absent in courses of semester V of UG & MCA, courses of Semester III of PG and courses of Semester I of M.Phil are eligible to appear in ESE – April along with final semester Examination.

June Supplementary Examinations (Theory):

- Final year students who have only one arrear in the courses of I – VI semesters of UG,I – IV semesters of PG, I – VI semesters of MCA and I semester of M.Phil are eligible to appear for June supplementary examinations.

Extension Activity:

- If a student is Not completed (NC) due to the lack of attendance, she has to redo the course along with the next batch after the payment of registration fee of Rs.250.

III. M.Phil - Special area study paper:

- M.Phil scholars who have passed in the Special area study paper are only eligible to submit the dissertation.
- After submission of dissertation, viva –voce will be conducted only to those scholars who have passed in all three papers offered in Semester I.

For submission of M.Phil Dissertation

Extension	Penalty Amount Rs.	Viva-voce in the Month
I (Upto 30 th June of Immediate)	750	July
II (Upto 31 st October of Immediate)	1500	November
III (Upto 31 st March of second year)	2000	April
IV (Upto 31 st October of second year)	3000	November