PYAY UNIVERSITY, DEPARTMENT OF PHYSICS

DISTRIBUTION OF MARKS

MSc FIRST YEAR SEMESTER I

Sr	Module No	Name of Module	Marks			
			Exam:	Tut/Assign	Pract	Tot:
1	Ph 611	Quantum Mechanics	70	30	–	100
2	Ph 612	Condensed Matter Physics	70	15	15	100
3	Ph 613	Nuclear Physics	70	15	15	100
4	Ph 614	Electronics	70	–	30	100

MSc FIRST YEAR SEMESTER II

Sr	Module No	Name of Module	Marks			
			Exam:	Tut/Assign	Pract	Tot:
1	Ph 621	Quantum Mechanics	70	30	–	100
2	Ph 622	Condensed Matter Physics	70	15	15	100
3	Ph 623	Nuclear Physics	70	15	15	100
4	Ph 624	Electronics	70	–	30	100

MSc Second Year SEMESTER I

Distribution of marks for Research & Seminar 1 (Ph 635)

No.	Description	Marks
1	Originality and Creativity	30
2	Contribution of research outcome to academic and national interest	30
3	Presentation	40
	Total	100

Distribution of marks for Seminar 2 (Ph 636)

No.	Description	Marks
1	Originality and Creativity	30
2	Contribution of research outcome to academic and national interest	30
3	Presentation	40
	Total	100

Distribution of marks for Research & Progress Report (Ph 637)

No.	Description	Marks
1	Research Progress Report	60
2	Organization of the Paper	20
3	Originality and Creativity	20
	Total	100

Distribution of marks for Research outline & Their Presentation (Ph 638)

No.	Description	Marks
1	Presentation	50
2	Response to Questions	50
	Total	100

MSc Second Year SEMESTER II

Distribution of marks for Research & Seminar (Ph 641)

No.	Description	Marks
1	Originality and Creativity	30
2	Contribution of research outcome to academic and national interest	30
3	Presentation	40
	Total	100

MSc Second Year SEMESTER II

Distribution of marks for Thesis and Viva (Ph 642)

No.	Description	Marks
1	Organization of the Thesis	40
2	Contribution of research outcome to academic and national interest	30
3	Response to Questions	30
	Total	100

Dissertation

All dissertations will vary in format, style and design. It is important that you familiarize yourself with the particular requirements of your institution and degree programme.

A typical format guide would require the dissertation to be word–processed with double or one–and–a–half spacing, and a wide left margin to enable binding. Most formats would include:

Dissertation format guide
Title Page
Table of Contents
List of Tables (if any)
List of Figures (if any)
Introduction
Literature Review
Methodology
Findings (Results)

(either a certatin number of chapters or an extended essay which has clearly identified sections)
Discussion
Conclusions and (if appropriate) recommendations
References
Appendices (e.g. questionnarires, interview transcripts, pilot reports, detailed tables etc.)

However you decide to divide up your chapters and sections, certain essential ingredients need to be present in some form. These will include:

Literature Review –Similar in form and length to a longish essay entitled 'how have set up my research topic and how it fits in with existing work in the area'

Methodology –Another essay–sized section entitled 'why I chose the methods I chose to answer my particular question, the strengths and weaknesses of that approach as a tool for generating knowledge, and how I actually did it'

Findings – Describing and preseenting your own data, evidence or case study could well take slightly less or more than the earlier sections. This will depend in part on the kind of findings you are presenting.

Discussion – This is the section that brings all of the strands of your argument together. One way to think of it is as a three–way conversation between the literature you discussed, the methodology you adopted and the findings you have presented.

Conclusion and recommendations –This chapter will draw together the conclusions as well as noting any recommendations for practice. You Should not include new ideas at this stage–they should have been deal with in the discussion section. You can include a reflection on doing the research study and also identify ways in which you, or others, might take the work forward as further research as well as training and dissemination. This chapter often runs out of steam–be warned!

<u>Summary</u>

The dissertation is an independent piece of research where you take a great deal of responsibility for your own learning.

It will demand the use of your communication, information–seeking and intellectual skills.

The social science based dissertation should normally include a number of standard features, including an introduction, a Literature Review, Methodology, Findings, and Conclusion and Bibliographic references.

You can, and should, value your own experiences and strengths as well as secondary resources.

MSc Physics Syllabus

MSc First Year (SemesterI)

Ph 611 Quantum Mechanics

The Stren–Gerlach Experiment, Kets, Bras and Operators, Base Kets and Matrix Representations, Measurements, Observables and the Uncertainty Relations, Change of Basis, Position, Momentum and Translation, wave Functions in Position and Momentum
Space Problems. Time Evolution and the Schrodinger Equation, The Schrodinger versus the Heisenberg Picture, Simple Harmonic Oscillator, Schrodinger's Wave Equation, Elementary Solutions to Schrodinger's Wave Equation, Propagators and Feynman Path Integrals,
Potentials and Gauge Transformations. Rotations and Angular Momentum Commutation Relations, Spin 1/2 Systems and Finite Rotations. Special Topics.

Reference: (1) Sakurai JJ "Modern Quantum Mechanics: Second Edition"

(2) Griffiths "Introduction to Quantum Mechanics"

(3) EugenMerzbacher "Quantum Mechanics"

Ph 612 Condensed Matter Physics

Dielectrics and Ferroelectrics, Macroscopic Electric Field, Local Electric Field at an Atom, Dielectric constant and Polarizability, Structural phase transitions, Ferroelectric Crystal, Problems, Special Topics.

Solid State Electronics: Semiconductor Materials and Their Properties, (The Valence Bond Model of the Semiconuductor, The Energy Band Model, Equilibrium Concentrations of Electrons and Holes Inside the Energy Bands, The Fermi Level and Energy Distribution of Carries Inside the Bands), The Temperature Dependence of Carrier Concentrations in an Extrinsic Semiconductor, Heavily Doped Semiconductors, Carrier Transport in Semiconductors, The Drift of Carriers in an Electric Field, Variation of Mobility with Temperature and Doping Level, Conductivity, Impurity Band Conduction, (The Hall Effect), & Problems, Special Topics.

Introduction to Nanoscience and Nanotechnology:***Size Matters, The Fundamental Importance of size, The Mechanic Behavior of Nanoparticles, & Problems*** **Special Topics** ***Preparation of electroceramics by Conventional Ceramics Method and Measurement of resistance, capacitance and calculation of dielectric constant(Practical)***

Reference: (1) Tyagi M S 200 "Introduction to Semiconductor Materials and Devices" (Singapore:Wiley & sons)

(2)Eugene A. Iren 2005 "ELECTRONIC MATERIALS SCIENCE" (Canada: John Wiley & Sons)

(3) Chris Binns:"Introduction to Nanoscience and Nanotechnology"
(New Jersy: John Wiley & Sons)
(4)Edward L. Wolf; "Nanopysics and Nanotechnology"(Weinheim:WILEY–VCH)

Ph 613 Nuclear Physics

Nuclear Structure Physics: Nuclear Masses, Rms Charge Radii, Charge Densities and Form Factors, Overview of Nuclear Decays. Special Topics.
Gas–filled Detectors, Scintillation Detectors, Semiconductor Detectors, Photon(Gamma–Ray and X–Ray) Spectroscopy. Special Topics.

Reference: (1)"Lecture Notes in Nuclear Structure Physics", Nov:2005,B.Alex Brown, Department of Physics and Astronomy, Michigan State University.
(2)"Measurement and Detection of Radiation", Second Edition, Nicholas Tsoulfanidis, University of Missouri–Rolla.

Ph 614 Electronics

Introduction to Digital Signal Processing: Basic Concept of Digital Signal Processing, Basic Digital Signal Processing ,Examples in Block Diagrams, Overview of Typical Digital Signal Processing in Real–World Applications, Digital Signal Processing Applications.
Signal Sampling and Quantization: Sampling of Continuous Signal, Signal Reconstruction, Analog–to–Digital Conversion, Digital–to Analog Conversion, and Quantization, MATLAB Programs. Digital Signals and Systems, Digital Signals, Linear Time–Invariant, Causal Systems, Difference Equations and Impulse Responses, Bounded–in–and–Bounded–out Stability, Digital Convolution. Discrete Fourier Transform and Signal Spectrum, Discrete Fourier Transform Amplitude Spectrum and Power Spectrum, Spectral Estimation Using Window Functions, Application to Speech Spectral Estimation, Fast Fourier Transform, Special Topics.

Reference: (1) Thomas,L,"Digital Fundamental",10^{th} edtion(Chapter 11)
(2) Willian Kleitz,"Digital Electronics, a practical approach with VHDL", 9th edtion.
(3) Thomas,L. Floyd, Electronic Devices: Electron flow version, 9th Edition.
(4) Li Tan,"Digital Signal Processing, Fundamental and Application" (Chapter 1,2,3,4)

MSc First Year Semester II

Ph 621 Quantum Mechanics

Density Operators and Pure Versus Mixed Ensembles, Eigenvalues and Eigenstates of Angular Momentum, Orbital Angular Momentum, Schrodinger's Equation for Central Potentials, Addition of Angular Momenta, Schwinger's Oscillator Model of Angular Momentum. Symmetry in Quantum Mechanics: Symmetries, Conservation Laws and Degeneracy, Discrete Symmetries, Parity of Space Inversion, Lattice Translation as a Discrete Symmetry, The Time–Reversal Discrete Symmetry. Problems. Special topics.

Reference:
(1) Sakural JJ"Modern Quantum Mechanics: Second Edition"
(2) Griffiths "Introduction to Quantum Mechanics"
(3) EugenMerzbacher "Quantum Mechanics"

Ph 622 Condensed Matter Physics

Diamagentism and Paramagnetism, Langevin diamagnetism equation, Quantum theory of diamagnetism of mononuclear systems, paramagnetism, Quantum theory of paramagnetism. Paramagnetic susceptibility of conduction electrons, Ferromagnetism and Antiferromagnetism,

Solid State Electronics: Excess Carriers in Semiconductors Injection of Excess Carriers, Recombination of Excess Carriers, Mechanisms of Recombination Processes, Origin of Recombination Centers, Excess Carriers and Quasi–Fermi Levels, Basic Equations for Semiconductors Device Operations, Electrical Breakdown in p–n Junctions Phenomenological Description of Breakdown Mechanisms, Theoretical Treatment of Internal Field Emission, Zener Breakdown in p–n Junctions, Secondary multiplication in semiconductors, avalanche breakdown in p–n junctiopn, Effect of Junction Curvature and Crystal Imperfections on the Breakdown Voltage, Dynamic Behavior of p–n Junction Diodes Small–Signal ac Impedance of a Junction Diode, The Charge Control Equation of a Junction Diode, Switching Transients in

Junction Diodes, Ohmic Contacts, Heterojunctions & Problems. (Special Topics: ***Magnetic Resonance, Nuclear magnetic resonance, line width, hyperfine splitting, nuclear quardrupole resonance, ferromagnetic resonance, antiferromagnetic resonance, electron paramagnetic resonance, principle of maser action & Problems.)***

Junctions and Devices and the Nanoscale: Introduction, Junctions, Metal–Metal Junctions, Metal–Semiconductor Junctions, & Exercises.

Preparation of soft magnetic materials by sol–gel autoconbustion Method and measurement of magnetic properties(Practical)

Reference:
(1) Tyagi M S 2000"Introduction to Semiconductor Materials and Devices" (Singapore: Wiley & sons)
(2) Eugene A. Iren 2005 "ELECTRONIC MATERIALS SCIENCE" (Canada: John Wiley & Sons)

(3) Chris Binns: "Introduction to Nanoscience and Nanotechnology
(New Jersey: John Wiley & Sons)
(4) Edward L. Wolf; "Nanophysics and Nanotechnology
(Weinheim: WILEY–VCH)

Ph 623 Nuclear Physics

Nuclear Structure Physics: The Fermi Gas Model, Overview of the Nuclear Shell Model, The One–body Potential. Radiation Sources, Interaction of Radiation wth Matter, Radiation Dosimetry. Special Topics

Reference: (1) "Lecture Notes in Nuclear Structure Physics". Nov: 2005, B, AlexBrown, Department of Physics and Astronomy, Michigan State University
(2) "Introduction to Health Physics", Fourth Edition, Herman Cember, Tomas E.Johnson

Ph 624 Electronics

The z–Transform: DSP System, Basic Filtering Types, and Digital Filter Realizations, Finite Impulse Response Filter Design, Infinite Impulse Response Filter Design, (Hardware and Software for Digital Signal Processors).
Embedded System on Programmable Chip design: Programmable FPGA applications
AND/OR
Wireless sensor Network
AND/OR
Sensor Programming on Mobile devices
AND/OR
Internet of Things (IoT)

Reference: (1) Li Tan, "Digital Signal Processing, Fundamental and Application"
(2) Richard G. Lyons, "Understanding Ditigal Signal Processing"
(3) Thomas, L. Floyd,"Digital Fundamental", 10^{th} edition.