

SUBJECT CODE	Cate gory	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem Univer sity Exam	Tw o Ter m Exa m	Teachers Assessme nt	End Sem Univer sity Exam	Teachers Assessme nt				
MSPH101	Core	Quantum Physics-I	60	20	20	0	0	3	1	0	4

Course Objectives:-

1. To develop the comprehensive understanding of Quantum Mechanics and applications.

Course Outcomes:-

1. Student will be able to understand basic phenomenon's and applications of Quantum Mechanics.

Ashu

Deepraj

Am

Am

SYLLABUS

MSPH101 [QUANTUM PHYSICS-I]

Unit-I: Limitations of classical mechanics, origin of Quantum Mechanics, Basic postulates of Quantum Mechanics, equation of continuity, properties and physical significance of wave function, Ehrenfest theorem, Schrödinger wave equation.

Unit-II: solution of Schrödinger wave equation for one dimensional infinite potential well and step, and bound states, solution of Schrödinger wave equation for linear Harmonic oscillator, operator algebra of harmonic oscillator.

Unit-III: Overview of linear vector spaces: Inner product space, operators, expectation values of physical variables, bases, Dirac notation, eigenvalues and eigenvectors, Completeness of eigen functions, Commutation relations.

Unit-IV: Angular momentum: Commutation relations, spin angular momentum, Pauli matrices, raising and lowering operators, L-S coupling, Total angular momentum, addition of angular momentum, Clebsch-Gordon coefficients.

Unit-V: Three dimensional problems: Solution of Schrödinger equation for free particle in spherically symmetric cavity, central potential, three dimensional harmonic oscillator, degeneracy, solution of Schrödinger equation for Hydrogen atom and its application to atomic spectra.

Text and reference books

1. L I Schiff: Quantum Mechanics (McGraw-Hill Book Company)
2. S Gasiorowicz: Quantum Physics (Wiley, New York)
3. J D Powell and B Craseman: Quantum Mechanics (Addison Wesley Publishing Company)
4. A P Messiah: Quantum Mechanics (North - Holland)
5. J J Sakurai: Modern Quantum Mechanics (Pearson Education, INC.)
6. Mathews and Venkatesan: A text book of Quantum Mechanics (Tata McGraw-Hill Publishing Company Ltd.)

Aradh

MS

Supriya

Suraj

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment				
MP202	Core	Anatomy, Physiology, and Radiobiology	60	20	20	0	0	3	1	0	4

Course Objectives:-

1. To develop the comprehensive understanding of Basic medical science.

Course Outcomes:-

1. Student will be able to understand the basic knowledge of anatomy, biochemistry and radiobiology.

Aradh

OS

Suprajit

Cur - 12

SYLLABUS

MSMP202 [ANATOMY, PHYSIOLOGY AND RADIOBIOLOGY]

Unit-1

Anatomy and physiology as applied to radiodiagnosis and radiotherapy – Cells, structure of cells, structure and functions of tissues, sex cells, early development – The tissues – the systems – skin, Cartilage and bone-bacteria – inflammation – infection – ulceration – neoplasm, Bone – the skeleton – joints – the skeletal system – the skull – vertebral column, thorax etc. The muscular system – the thoracic cage – the mediastinum, the diaphragm the abdominal cavity and abdominal regions – Anatomy of the heart.

Unit-2

Anatomical systems – cardiovascular system, respiratory system, Alimentary urinary system, nervous system, lymphatic system, Reticuloendothelial System, reproductive system, eye and ear, mammary gland and endocrine gland and its functions function of adrenal, thyroid etc. Secretion- physiological action, effect on removal, effect on administration.

Unit-3

Radiation biophysics: Elements of cell biology, Action of radiation on living cells, Direct and indirect action, effects of ionizing radiation at molecular, sub-cellular levels, secondary effects, free radicals formation, Target theory, bacterial and mammalian cell survival, application in cancer therapy, food preservation, radiation sterilization etc.- Role of water, oxygen and temperature – Effects of radiation on nucleic acids, proteins and enzymes, radiation sensitivity at different stages of cell cycle, invitro and invivo effects .

Unit-4

Physical and biological factors affecting cell survival tumor re- growth, normal tissue response, repair distribution in the cell cycle, Time dose fraction (TDF) - basis for dose fractionation in radiotherapy - Concept of nominal standard dose (NSD), Linear Quadratic models. Initial changes in a cell due to irradiation, LET and its effect, immediate radiochemical effects, solvated electrons and radicals, radiolysis of water, effects on macro molecules like DNA, dependence of radiation damage on LET .

Unit-5

Cell survival curve, mathematical aspects of survival curves, multi target single hit survival curves, statistical nature of radiation damage . Effects of radiation on different systems in man, dependence on dose and dose rate, tolerance limits for various systems, acute radiation syndrome, effects of low level irradiation, effects relevant to women, fetus and children.

Amb

Ch

Suprajyoti

Ch

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

References

1. C.K.Warrick, "Anatomy and Physiology for Radiographers" Oxford University Press 1988.
2. Aiterts B.Bray, Lewis J., Raft M., Roberts K., Watson J.D, Molecular Biology of Cell, Garland Publishing Inc. London 1983.
3. Van Holde K.E, Physical Biochemistry, Prentice Hall, New Jersey, USA 1971.

Anubh

(Signature)

Deepraj

Chetw

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME							
			THEORY			PRACTICAL		Th	T	P
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment			
PSMP203	Core	Radiation Detection, Measurements, Instruments	60	20	20	0	0	3	1	0

Course Objectives:-

1. To develop the comprehensive understanding of Radiation Detection, Measurements and Instruments.

Course Outcomes:-

1. Student will be able to study detection of radiation, measurement of radiation and handling of radiation measuring instruments.

Handwritten signature

Handwritten signature

Handwritten signature

Handwritten signature

SYLLABUS

MSMP203 [RADIATION DETECTION, MEASUREMENTS, INSTRUMENTS]

Unit-1

Principles of measurements of radiation and radioactivity: collimation, geometry and calibration- Gas filled ionization chamber, proportional counters, GM counters- Scintillation detectors, Methods of measurements of radioactivity – Defined solid angle and 4π counting – Beta- Gamma coincidence counting – Standardization of beta emitters and e-capture nuclides with proportional, G.M and scintillation counters- standardization of gamma emitters with scintillation spectrometers, Ionisation chamber methods .

Unit-2

Random fluctuations – Evaluation of equipment performance – Selection of operating voltage – Energy dependence of voltage characteristics and discriminator setting – Preset time and preset count- Resolving time – Use of rate meters and recorders – Efficiency and sensitivity of radiation detectors – statistical aspects of gamma ray and beta ray counting –Statistical accuracy in the double isotope techniques .

Unit-3

Radiation survey meter – Contamination monitors – Alpha scintillation 'Poppy' Portable radiation probe for alpha, beta, gamma rays and neutrons – Gamma Spectrometers – Medical scintillation probe and scanners – Miscellaneous instruments such as Hand and Foot monitor, continuous air sampler, whole body monitor etc. – Thermal and fast neutron survey meters.

Unit-4

Instruments of personal monitoring, digital pocket dosimeters using solid state devices and GM counters, portable survey meters, gamma area (zone) alarm monitors, contamination monitors for alpha, beta and gamma radiations, scintillation monitors for x ray and gamma radiations-neutron monitors-tissue equivalent survey meters-flux meters, dose equivalent monitors, instruments for counting and spectroscopy-portable counting systems – gamma ray spectrometers.

Unit-5

Photographic film dosimetry – Film response to X-beta and gamma rays and thermal neutrons – Nuclear track emulsions for fast neutron dosimetry – beta, gamma dosimetry with chemical systems – Organic and inorganic systems Ferrous-ferric and ceric-cerous systems – Glass dosimetry – Calorimetry.

Aradh

Am

Suprajyoti

Ram S W

References

1. W.E. Burcham & M. Jobes – Nuclear and Particle Physics – Longman (1995).
2. W.J.Meredith and J.B.Massey “Fundamental Physics of Radiology” John Wright and sons, UK, 1989.
3. Evans D.H, McDicken. W.N, Skidmore R and Woodcock J.P (1988) Doppler ultrasound Physics Instrumentation and Clinical Applications, John Wiley, Chichester, 1988.
4. J.R.Greening “Fundamentals of Radiation Dosimetry”, Medical Physics Hand Book Series No.6 Adam Hilger Ltd., Bristol 1981.
5. Practical Applications of Radioactivity and Nuclear Radiations, G.C.Lowental and P.L.Airey, Cambridge University Press, U.K., 2001 .

Ashu

PS

Deepa

Cur

SEM-II

Paper-IV: NUMERICAL TECHNIQUES AND COMPUTER PROGRAMMING

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment				
MSMP 204	Core	NUMERICAL TECHNIQUES AND COMPUTER PROGRAMMING.	60	20	20	0	0	3	1	0	4

Course Objectives:-

1. To develop the comprehensive understanding about Computer Programming in C.
2. To develop the ability to apply C Programming to solve scientific problems using Numerical Techniques.

Course Outcomes:-

1. Student will be able to write Program in C.
2. Student will be able to apply C Programming to solve scientific problems using Numerical Techniques.

Aradhya

Aradhya

Aradhya

Aradhya

SYLLABUS

MSMP204

[NUMERICAL TECHNIQUES AND COMPUTER PROGRAMMING]

Unit I

Introduction to C Programming - overview and importance of C, Elements of C Language and Program constructs - structure of C program - character set, tokens, keywords, identifier - Data types, constants, symbolic constants, variables, declaration, data input and output, assignment statements. Operators in C - arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, special operators, precedence of operators - arithmetic expressions - evaluation of expressions, type conversion in expressions - precedence and associativity - mathematical functions - I/O operations.

Unit II

Decision making - IF statement, IF ELSE statement, Nesting of IF ELSE and ELSE IF Ladder, SWITCH statement, BREAK statement, CONTINUE statement, GOTO statement, return statement. Looping - WHILE, DO-WHILE, and FOR loops, nesting of loops, skipping & breaking loops. Arrays - single dimension arrays - accessing array elements - initializing an array, two dimensional arrays.

Unit III

The Concept of modularization - defining function - types of functions - User defined functions - function prototype and definition - arguments - passing parameters - call by reference - call by value - returning - nesting of functions and recursion - passing arrays.

Unit IV

Solution of Algebraic & Trancedental Equations: Regula Falsi , Newton-Raphson, Iterative, Secant Method, Solution of simultaneous linear equatins: Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods.

Unit V

Solution of Ordinary Differential Equations: Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method,

References

1. Martin M. Lipschutz and Seymour Lipschutz, Schaum's Outline of Theory and Problems of Data Processing, ISBN: 9780070379831 (Unit I Part A).

Aach

Q

Supriya

Chandra

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

2. Anil Bikas Chaudhuri, The Art Of Programming Through Flowcharts & Algorithms, Laxmi Publications, New Delhi (Unit I Part A).
3. Jean Paul Trembley and Pual G Sorenson, An Introduction to Data Structures with Applications, Tata McGraw Hill (Unit I Part B).
4. R G Dromey, How to Solve by Computer, Pearson Education, 5 th Edition, ISBN: 0134340019 (Unit I Part B).
5. J.B Dixit, Computer Fundamentals and Programming in C, Firewall Media, ISBN: 8170088828. (Unit I Part C).
6. Applications of Numerical Techniques with C Paperback – 2009 by S. Chandra.
7. Numerical Methods: Problems and Solutions Paperback – 1 Jan 2004 by M K Jain

Anil

Sheparajug

Chandra

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment				
MSPH205	DC	Medical Physics and Computer Programming Lab	00	00	00	90	60	0	0	12	6

List of Experiments: Experiment will be done at Cancer Care Trust Hospital, Indore

Experiments will be related to the Topic covered in

1. INTRODUCTION TO RADIATION PHYSICS
2. BASIC MEDICAL SCIENCE
3. RADIATION DETECTION, MEASUREMENTS, INSTRUMENTS

Aradh

Ch

Deepa

Ch