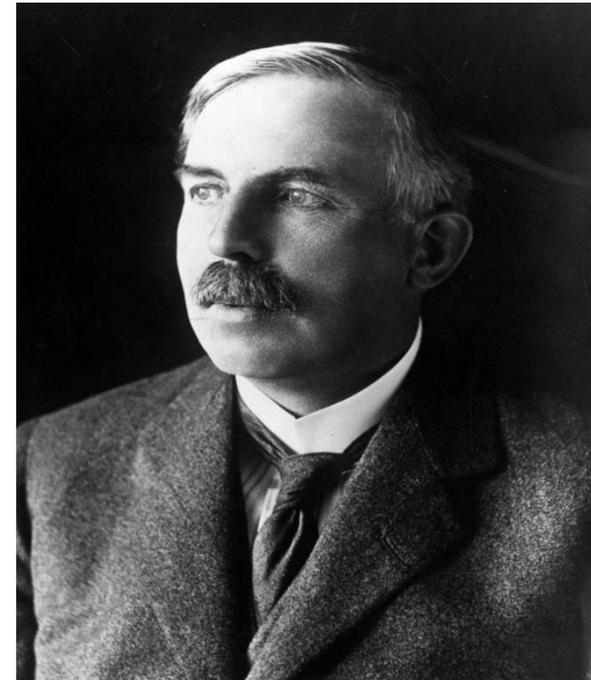
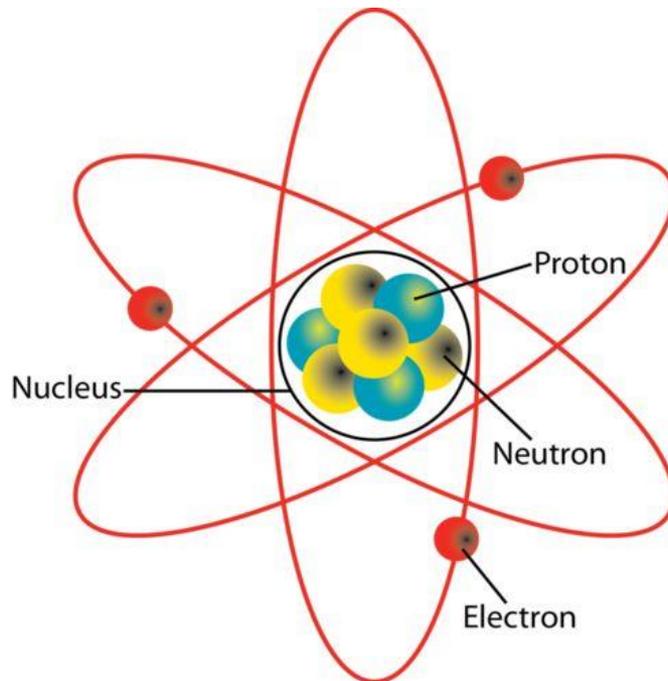




MPM: 203 NUCLEAR AND PARTICLE PHYSICS

Lecture-1: Introduction

By Prof. B. K. Pandey, Dept. of Physics and Material Science





Plan For the Preparation of Subject Contents in Semester-III of M.Sc. Physics

By- Prof. B. K Pandey
Head Department of Physics and
Material Science



ACADEMIC SECTION
M. M. M. UNIVERSITY OF TECHNOLOGY, GORAKHPUR (UP)
Academic Calendar (Session 2020-21)

Date	Days	Activities
August 31, 2020	Mon	Commencement of Classes of ODD Semester for Existing Students (II Year onwards)
September 1-4, 2020	Tue-Fri	Online Registration/Fee Deposit by Students (DD Deposit for Education Loan) (All existing students of B. Tech./M. Tech./M.B.A./B.B.A./M.C.A/M.Sc./ Ph.D. Except first Year)
September 11, 2020	Fri	Registration with Late Fee (for existing students)
September 21, 2020	Mon	Last Date for Quiz 1: After completion of Unit I (10 Marks)
October 12, 2020	Mon	Last Date for Quiz 2: After completion of unit II (20 Marks comprising of both Unit I & Unit II)
Oct 14-16,2020	Wed-Fri	Mid Semester Presentation of B. Tech Project/ M. Tech/ M.Sc. Dissertation:
Oct 15,2020	Thu	Last date of drop of subjects for B. Tech Final Year students
03 November, 2020	Tue	Last Date for Quiz 3: After completion of Unit III (10 Marks)
23 November, 2020	Mon	Last Date for Quiz 4: After completion of Unit IV (10 Marks)
24 November, 2020	Tue	Students online feedback: After completion of Unit IV
Nov 25-26, 2020	Wed-Thu	End semester presentation of B. Tech Project/ M.Tech/ M.Sc Dissertation
Nov 28, 2020	Sat.	Last date of odd Semester classes (except first year)
Nov 30,2020	Mon.	Arrival of II/III/IV-year students except B.Tech. First Yr
Dec 1,2020	Tue	University Foundation Day Celebration
Dec 1-10,2020	Tue-Thu	Practical classes for all students (except First Yr)
Dec 14-16,2020	Mon-Wed	DRC of Ph.D students
Dec 17-24,2020	Thu-Thu	Winter Vacation for faculty and preparatory leave for students
Dec 25-26,2020	Fri-Sat.	Malaviya Jayanti/Alumni Meet
Dec 28-30,2020	Mon-Wed	End Semester Practical Exam
Jan 1-15, 2021	Fri-Fri	Major Theory Examination/End Semester Examination
Jan 16-18, 2021	Sat-Mon	Registration for Even Semester 2020-21
Jan 19, 2021	Tue	Commencement of Classes for Even Semester
Jan 27, 2021	Wed	Registration with late fee.
27 February 2021	Sat	Last date for Quiz-1 Viva Exam of all Practical Classes and Mid Semester Presentation of B.Tech Project/M.Tech/M.Sc Dissertation
March 1-8, 2021	Mon-Mon	Minor Test/Mid Term Exam
March 15, 2021	Mon	Last date of drop of subjects(only for final year B.Tech students)
March 25 - 31, 2021	Thu-Wed	Mid Semester Break for students
April 23, 2021	Fri	<ul style="list-style-type: none"> • Last date for pre-submission of M.Tech/M.Sc Dissertation, • Last date for Quiz-2 • Last date for Students Online feedback
April 24, 2021	Sat	Last day for end semester classes
April 26-29, 2021	Mon-Thu	End Semester Practical Examination/Submission of M.Tech/ M.Sc dissertation
May 1 -15 May, 2021	Sat-Sat	Major Theory Examination/End Semester Examination
May 17-22, 2021	Mon-Sat	DRC of Ph.D students/ M.Tech/M.Sc dissertation viva
May 24 to July 15, 2021	Mon-Thu	<ul style="list-style-type: none"> • Summer Term-2021 • Summer Vacation for faculty
<p>Notes(i) Unless otherwise prescribed, the classes will start from the next day of registration of respective Programmes (ii) One extra period is assigned from 8.30-9.20 am for the compensatory/extra classes and teacher shall keep the records of the same. (iii) Academic Calendar for the newly admitted students will be notified separately.</p>		



Credit Structure of Semester-III

S. N.	Category	Paper Code	Subject Name	L	T	P	Credits
1.	PC	MPM-201	Thermodynamics and Statistical Mechanics	3	1	0	4
2.	PC	MPM-202	Optoelectronics and Optical Communication System	3	1	0	4
3.	PC	MPM-203	Nuclear and Particle Physics	3	1	0	4
4.	PC	MPM-204	Optoelectronics and Optical Communication Lab	-	-	4	2
5.	PE-3	MPM***	Program Elective-3	3	1	0	4
6.	D	MPM-350	Dissertation Part-I	0	0	6	3

***** One course from Program Elective-3**



List of Program electives in Semester-III

S. N.	Subject Name		L	T	P	Credits
1.	MPM-221	Advance Quantum Mechanics	3	1	0	4
2.	MPM-222	Quantum Field Theory	3	1	0	4
3.	MPM-223	Fiber Optics and Nonlinear Optics	3	1	0	4
4.	MPM-224	Wireless Communication	3	1	0	4
		Total	12	4	0	16



Department of Physics and Material Science
MMM University of Technology, Gorakhpur
Timetable for the Session 2020-2021 (Odd)
Sub: M.Sc. Physics (1st & 3rd Semester)

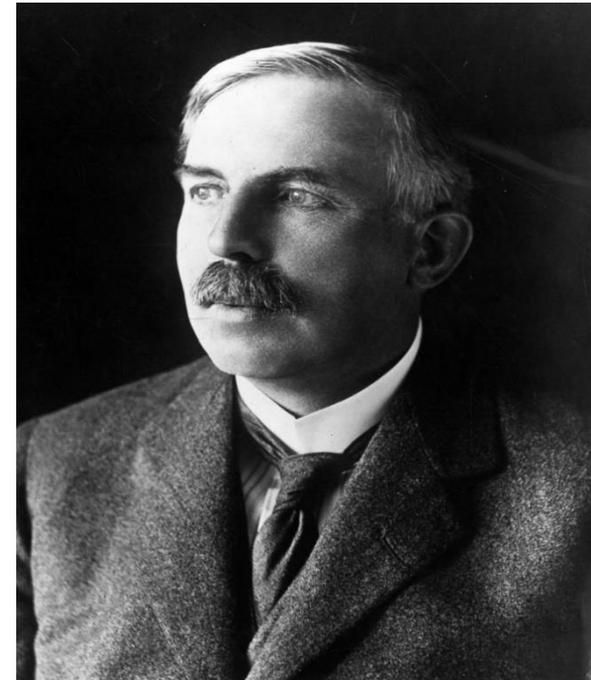
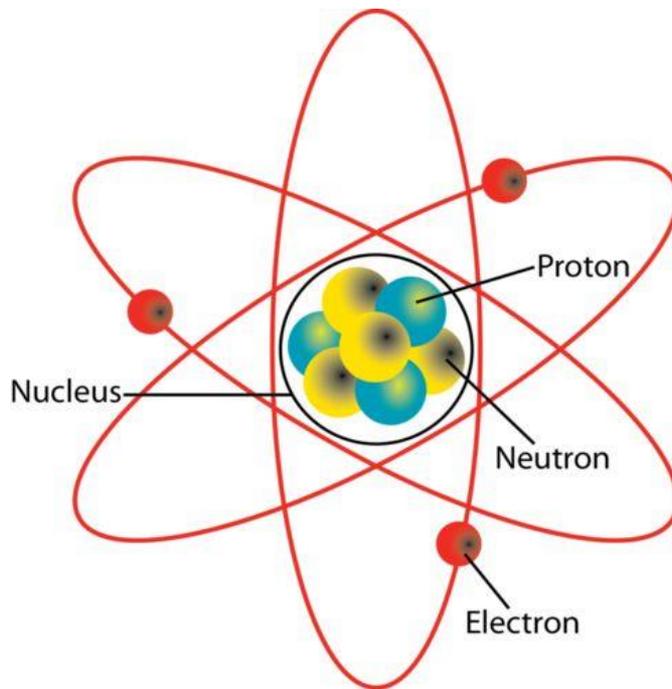
Day/ Period	I 9:30-10:20	II 10:25-11:15	III 11:20-12:10	IV 12:15-1:05	E (01.40-2.30)	V (2:30-3:20)	VI 3:20-4:10	VII 4:10-5:00
Mon	L MPM-101 BKP AS-102	L MPM-104 DKD AS-102	L MPM-102 SPS AS-102	L MPM-103 AKG AS-102	MPM-105, Electronic Device and Circuit Lab /Sachin / 1 st batch		MPM-105, Electronic Device and Circuit Lab / Sachin / 2 nd batch	
Tue	L MPM-101 BKP AS-102	L MPM-104 DKD AS-102	L MPM-102 SPS AS-102	L MPM-103 AKG AS-102	MPM-105, Electronic Device and Circuit Lab /Sachin / 1 st batch		MPM-105, Electronic Device and Circuit Lab / Sadanand/ 2 nd batch	
Wed	L MPM-101 BKP AS-102	L MPM-104 DKD AS-102	L MPM-102 SPS AS-102	L MPM-103 AKG AS-102	T MPM-203 Sadanand AS-102	T MPM-221 Sachin AS-102	T MPM-201 Archna AS-102	T MPM-202 Shambhavi AS-102
					MPM-102, Condensed Matter Physics Lab /Archna / 1 st batch		MPM-102, Condensed Matter Physics Lab / Archna / 2 nd batch	
Thurs	L MPM-203 BKP AS-102	L MPM-202 DKD AS-102	L MPM-201 SPS AS-102	L MPM-221 AKG AS-102	T MPM-101 Sadanand AS-102	T MPM-103 Sachin AS-102	T MPM-102 Archna AS-102	T MPM-104 Sadanand AS-102
					E (01.40-2.30) + V (2:30-3:20)			
					MPM-204, Optoelectronics and Optical Communication Lab /Shambhavi / 1 st batch		MPM-204, Optoelectronics and Optical Communication Lab / Shambhavi / 2 nd batch	
Fri	L MPM-203 BKP AS-102	L MPM-202 DKD AS-102	L MPM-201 SPS AS-102	L MPM-221 AKG AS-102	MPM-204, Optoelectronics and Optical Communication Lab / Shambhavi / 1 st batch		MPM-204, Optoelectronics and Optical Communication Lab / Shambhavi / 2 nd batch	
Sat	L MPM-203 BKP AS-102	L MPM-202 DKD AS-102	L MPM-201 SPS AS-102	L MPM-221 AKG AS-102				

Important Notes: - "Dissertation Part-I" class will be "taken by all regular faculties" for the 3rd Semester M.Sc.-Physics Students **as per their schedule.**



MPM: 203 NUCLEAR AND PARTICLE PHYSICS

Nuclei And Its Properties





Syllabus Content

MPM: 203 NUCLEAR AND PARTICLE PHYSICS

4 Credits (3-1-0)

- **UNIT 1: Nuclei and Its Properties** **09 Lecture**
- Discovery of the nucleus, Rutherford scattering: Scattering cross-section, form factors, Kinematics of (non-) relativistic scattering, Properties of nuclei: size, mass, charge, angular momentum, magnetic moment, parity, quadrupole moment, Charge and mass distribution, Mass defect, Binding-energy statistics, Bethe-Weiszacker mass formula, Magic numbers, Characteristics of nuclear forces -Range and strength



Syllabus Content

MPM: 203 NUCLEAR AND PARTICLE PHYSICS

4 Credits (3-1-0)

- **UNIT 2: Nuclear Stability** **09 Lecture**
- Nuclear stability: alpha, beta and gamma decay, Tunneling theory of alpha decay, Fermi theory of beta decay, Parity violation, Nuclear reactions: Fission and fusion, Construction and function of nuclear reactors, Nuclear models: Shell model, Nilson model etc.



Syllabus Content

MPM: 203 NUCLEAR AND PARTICLE PHYSICS

4 Credits (3-1-0)

- **UNIT 3: Nuclear Stability** **09 Lecture**
- Elementary particles, Classification and properties of elementary particles: Leptons, Baryons, mesons particles and antiparticles, Excited states and resonances, Various types of interactions: Gravitational, electromagnetic, weak and strong interactions and their mediating quanta..



Syllabus Content

MPM: 203 NUCLEAR AND PARTICLE PHYSICS

4 Credits (3-1-0)

- **UNIT 4: Conservation Laws** **09 Lecture**
- Conservation laws in fundamental interactions, Charge symmetry and charge independence, Parity and charge conjugation, Conservation of parity and its violation in different types of interactions, Strange particles: Associated production, strangeness and decay modes of charged Kaons, Isospin and its conservation.



- **REFERENCE BOOKS**

- 1. Concepts of Nuclear Physics by B.L. Cohen (Tata McGraw Hill)
- 2: Nuclear Physics by Irving. Kaplan (Addison-Wesley) Narosa
- 3: Introduction to Elementary Particles by D. Grrifiths (Academic Press, 2nd ed. 2008)
- 4: Nuclear and Particle Physics: An Introduction by B. R. Martin (Wiley, 2006)
- 5: Physics of Nuclei and Particles by Pierre Marmier and Eric Sheldon (Elsevier)
- 6: Nuclei and Particles by Emilio G. Segre (2nd ed. Basic Books)
- 7: Introduction to Nuclear and Particle Physics by A. Das and T. Ferbel (World Scientific)
- Nuclear Physics by S, N, Ghoshal Published from S. Chand