NOTIFICATION
(22/Sept./Adp/23)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipatio of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Cours of Study in the subject of **Physics** of Semesters Ist and IInd for **Four Year Under Gradua Programme** under the **Choice Based Credit System** as per **NEP-2020 (as given in the annexure)** the examinations to be held in the years as per the details given below:

Subject	Semester	for the examination to be held in the years
Physics	Semester-I	December 2022, 2023 and 2024
	Semester-II	May 2023, 2024 and 2025

The Syllabi of the courses is available on the University website: **www.jammuuniversity.ac.i**

Sd/-
DEAN ACADEMIC AFFAIF

No. F. Acd/II/22/4946—5003
Dated: 13-9-2022

Copy for information and necessary action to:

1. Special Secretary to the Vice-Chancellor, University of Jammu for information of Hon'ble Vice-Chancellor
2. Dean, Faculty of Science
3. HOD/Convener, Board of Studies in Physics
4. Sr. P.A.to the Controller of Examinations
5. All members of the Board of Studies
6. Confidential Assistant to the Controller of Examinations
7. I/C Director, Computer Centre, University of Jammu
8. Deputy Registrar/Asst. Registrar (Conf. /Exams. UG/ Exam Eval Non-Prof/CDC)
9. Incharge, University Website for Uploading of the notification.

Deputy Registrar (Academic)

UNIVERSITY OF JAMMU

SYLLABII OF PHYSICS FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP)
UNDER CBCS AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2022

List of Major, Minor, Multi-disciplinary and Skill Enhancement Courses in Physics for Ist and 2nd Semesters of FYUGP (Four Year Undergraduate Program) as per NEP-2020

SEMESTER-I

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical		
					Mid Semester	End Semester	Assessment	Exam	
1.	Major	UMJPYT101	Mechanics	3Th + 1P	15	60	10	15	100
2.	Minor	UMIPYT102	Kinematics	3Th + 1P	15	60	10	15	100
3.	Multi-disciplinary	UMDPYT103	Physics in Daily Life	3	15	60	------	-------	75
4.	Skill Enhancement	USEPYT104	Physics Lab Skills	2	10	40	-------	-------	50

SEMESTER-II

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical		
					Mid Semester	End Semester	Assessment	Exam	
1.	Major	UMJPYT201	Electrostatics and Magnetism	3Th + 1P	15	60	10	15	100
2.	Minor	UMIPYT202	Electromagnetis-m	3Th + 1P	15	60	10	15	100
3.	Multi-disciplinary	UMDPYT203	Renewable Energy and Energy Harvesting	3	15	60	------	------	75
4.	Skill Enhancement	USEPYT204	Physics Workshop Skills	2	10	40	------	------	50

UNIVERSITY OF JAMMU
Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	For Practicals : Final Exam : 15 Marks Continuous Assessment: 10 Marks

Syllabus for Theory (3 Credits)

Note : The Mid Semester Examination shall be conducted after completing 50% of syllabus.

Course learning outcomes:

- *Understand Coordinate systems, laws of motion and their application to various dynamical situations, notion of inertial frames and concept of Galilean invariance.*
- *Understand the phenomena of collisions and idea about centre of mass and laboratory frames and their correlation.*
- *Understand the principles of elasticity through the study of Young's Modulus and modulus of rigidity.*
- *In the laboratory course, the student shall perform experiments related to mechanics.*

Unit- I

Coordinate Systems: Unit vectors, displacement, velocity, acceleration, area and volume elements in Cartesian, Spherical Polar coordinates and cylindrical coordinate systems

Frames of Reference: Inertial and non-inertial frames of reference, uniformly rotating frame, Coriolis force and centrifugal force, effect of centrifugal force due to rotation of the earth, Coriolis force on a freely falling body, geographical effects of Coriolis force (qualitative)

Unit- II

Collision of Particles: Concept of centre of mass, Elastic collision in laboratory and centre of mass systems, Relationship between displacement, velocities, kinetic energies and angles in lab and centre of mass system.

Motion Under a Central Force: Concept of central and non-central forces, Equivalent one body problem, Angular momentum conservation in a central force field, Motion in a plane, energy of reduced mass and its conservation, differential equation of orbit in a central force field, turning points of motion, relation between eccentricity and energy, shapes of orbits, Kepler's laws of planetary motion.

UNIVERSITY OF JAMMU
Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P :**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	For Practicals : Final Exam : 15 Marks Continuous Assessment: 10 Marks

Unit- III

Oscillations: Simple harmonic motion**,** differential equation of SHM and its solution, velocity and acceleration in simple harmonic motion, kinetic energy and potential energy of a simple harmonic oscillator, Examples of SHM: compound pendulum, torsional pendulum, bifilar oscillations, LC circuit, oscillations of two masses connected by a spring, Helmholtz resonator.

Unit- IV

Damped oscillations: Nature of damping force, differential equation of damped harmonic oscillator and its solution, energy and power dissipation, logarithmic decrement, quality factor and relaxation time. Example of damping in physical systems, resistance damping, Electromagnetic damping in a moving coil galvanometer.
Forced oscillations: Transient and Steady state behaviour, Resonance.

Note for paper setters for End Semester Examination:
The question paper will be of 60 marks. There shall be 2 sections in the question paper with pattern as follows:
Section A shall comprise of 4 short answer type questions (of 3 marks each) with one question from each unit. The students have to attempt all the questions from Section A.
Section B shall comprise of a total of 8 questions with two questions selected from each unit. Each question shall be of 12 marks. The students have to attempt 4 questions by selecting only one question from each unit.
The numerical problems should not exceed more than 20% of the maximum marks.

Note for paper setters for Mid Semester Examination: The Mid Term Examination shall be conducted by the course coordinator after completion of 50% of the syllabus.
The question paper will be of 15 marks. There shall be 2 sections in the question paper with pattern as follows :
Section-A shall comprise of 3 questions (of 4 marks each) and the students are required to attempt any two questions.
Section-B shall comprise of 2 questions (of 7 marks each) and the students are required to attempt any one question.

UNIVERSITY OF JAMMU
Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	**For Practicals :** Final Exam : 15 Marks Continuous Assessment: 10 Marks

Text and Reference Books:
1. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
2. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
3. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
4. Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.
5. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands, 2008, Pearson Education
6. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
7. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000 University Physics.

Syllabus for Practicals (C.No. UMJPYT101)
Note : Perform any five of the following experiments as per the availability of equipments/ apparatus

List of Experiments:
1. To determine the height of a building using a Sextant.
2. To study the Motion of Spring and calculate (a) Spring constant, (b) **g** and (c) Modulus of rigidity.
3. To determine the Moment of Inertia of a Flywheel.
4. To determine value of **g** and velocity for a freely falling body using Digital Timing Technique
5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
6. To determine the value of g using Bar Pendulum.
7. To determine moment of inertia of a rectangular bar or slab / Bifilar Oscillator.
8. To determine the Young's modulus of a metal/alloy bar using Bending of beam method.

Note: *The concerned department may add some more practicals on the availability of some new equipments related to the course.*

Pattern of Exam: Continuous Assessment: 10 marks

Final Examination: 15 marks

UNIVERSITY OF JAMMU
Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	**For Practicals :** Final Exam : 15 Marks Continuous Assessment: 10 Marks

Text and Reference Books Recommended:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal.
4. B.Sc. Practical Physics by Harnam Singh
5. Advanced Practical Physics for Students by Worsnop and Flint

UNIVERSITY OF JAMMU
Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Minor
Course Name:	Kinematics	**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	**For Practicals :** Final Exam : 15 Marks Continuous Assessment: 10 Marks

Syllabus for Theory (3 Credits)

Note : The Mid Semester Examination shall be conducted after completing 50% of syllabus.

After going through the course, the student should be able to
- *Understand Coordinate systems, laws of motion and their application to various dynamical situations, notion of inertial frames and concept of Galilean invariance.*
- *Understand the phenomena of Oscillations and damped oscillations through SHM and damped harmonic oscillator.*
- *Understand the principles of elasticity through the study of Young's Modulus and modulus of rigidity.*
- *In the laboratory course, the student shall perform experiments related to kinematics.*

Unit- I

Coordinate Systems: Unit vectors, displacement, velocity, acceleration, area and volume elements in Cartesian, Plane polar coordinates and spherical Polar coordinate systems.

Frames of Reference: Inertial and non-inertial frames of reference, uniformly rotating frame, Coriolis force and centrifugal forces, Coriolis force on a freely falling body.

Unit- II

Motion Under a Central Force: Concept of central and non-central forces, Equivalent one body problem, Angular momentum conservation in a central force field, Motion in a plane, Energy of reduced mass and its conservation, Differential equation of the orbit, Turning points of motion, Relation between eccentricity and energy, Kepler's laws

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I		Type:	Minor
Course Name:	Kinematics		**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)		**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)			
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)			

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	**For Practicals :** Final Exam : 15 Marks Continuous Assessment: 10 Marks

Unit- III

Elasticity: Hooke's law - Stress-strain diagram - Elastic modulii, Relation between elastic constants, Poisson's Ratio, Expression for Poisson's ratio in terms of elastic constants, Work done in stretching and work done in twisting a wire, Twisting couple on a cylinder, Bending of beams, Determination of modulus of rigidity by static method and moment of inertia by torsion pendulum.

Unit- IV

Oscillations: Simple harmonic motion**,** Differential equation of SHM and its solution, Kinetic energy and potential energy of a simple harmonic oscillator, Examples of SHM: compound pendulum, torsional pendulum, bifilar oscillations, LC circuit, oscillations of two masses connected by a spring,

Damped oscillations: Differential equation of damped harmonic oscillator and its solution, Logarithmic decrement, Energy of damped oscillator, Power dissipation, Quality factor, Relaxation time.

Text and Reference Books:

1. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
2. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
3. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
4. Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.
5. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands, 2008, Pearson Education
6. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
7. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000 University Physics.

Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Minor
Course Name:	Kinematics	**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

<table>
<tr><td colspan="2">For Theory :
End Semester Exam : 60 Marks
Mid Semester Exam: 15 Marks</td><td colspan="2">For Practicals :
Final Exam : 15 Marks
Continuous Assessment: 10 Marks</td></tr>
</table>

Note for paper setters for End Semester Examination:
The question paper will be of 60 marks. There shall be 2 sections in the question paper with pattern as follows:
Section A shall comprise of 4 short answer type questions (of 3 marks each) with one question from each unit. The students have to attempt all the questions from Section A.
Section B shall comprise of a total of 8 questions with two questions selected from each unit. Each question shall be of 12 marks. The students have to attempt 4 questions by selecting only one question from each unit.
The numerical problems should not exceed more than 20% of the maximum marks.

Note for paper setters for Mid Semester Examination: The Mid Term Examination shall be conducted by the course coordinator after completion of 50% of the syllabus.
The question paper will be of 15 marks. There shall be 2 sections in the question paper with pattern as follows :
Section-I shall comprise of 3 questions (of 4 marks each) and the students are required to attempt any two questions.
Section-II shall comprise of 2 questions (of 7 marks each) and the students are required to attempt any one question.

Syllabus for Practicals (C.No. UMIPYT102)

Perform any five of the following experiments subject to the availability of equipments/ apparatus

List of Experiments:
1. To determine the Moment of Inertia of a Flywheel.
2. To determine the Young's Modulus of a Wire by bending beam Method.
3. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
4. To determine the elastic Constants of a wire by Searle's method.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I		Type:	Minor
Course Name:	Kinematics		**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)		**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)			
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)			

For Theory :	For Practicals :
End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	Final Exam : 15 Marks Continuous Assessment: 10 Marks

5. To determine the value of g using Bar Pendulum.

6. To determine the value of g using Kater's Pendulum.
7. To find the surface tension of water by Jaeger's Method.
8. To determine the frequency of A.C. mains using electric vibrator.

Note: The concerned department may add some more practical on the availability of some new practical as per Lab title.

Pattern of Exam: Continuous Assessment: 10 marks

Final Examination: 15 marks

Text and Reference Books:

1. B.Sc. Practical Physics by C. L. Arora.
2. Practical Physics by G L Squires Cambridge University Press
3. Advanced Practical Physics for Students by Worsnop and Flint
4. Practical Physics by R K Shukla
5. B.Sc. Practical Physics by Harnam Singh

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**Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024**

Semester :	I	Type:	Multi-disciplinary
Course Name:	Physics in Daily Life	**Course Code:**	UMDPYT103
Credits:	3	**L T P:**	3-0-0
Contact Hrs.	45		
Duration of Exam	3 Hours	**End Semester Exam**	**60 Marks**
		Mid Semester Exam	**15 Marks**
Mid Semester Exam shall be conducted after completing 50% of syllabus.			

Course Outcomes:
The aim of this course is to enable the students to be familiar with various basic physical phenomena.

Unit-I
Quantities, Energy and Power: Physical quantities, Standards and Units, International system of Units, Standards of time, length and mass, Precision and significant figures, errors.
Energy and Power: Explosions and energy; Kinetic energy and conservation of momentum in explosions; Heat energy and its units; Energy table and discussions; Discussion of cost of energy; Measuring energy; Power; Different power sources.

Unit-II
Gravity, Force and Space: The force of Gravity; Newton's third law; Weightlessness; Low earth orbit; Geosynchronous satellites; Spy satellites; Medium Earth Orbit satellite; Circular Acceleration; momentum; Rockets; Airplanes, helicopters and fans; Hot air and helium balloons; angular momentum and torque.

Unit-III
Nuclei and radioactivity: Radioactivity; Elements and isotopes; Radiation and rays; Seeing radiation; The REM – The radiation poisoning; Radiation and cancer; The linear hypothesis; Different types of radiation; The half-life rule; Smoke detectors; measuring age from radioactivity; Environmental radioactivity; Glow of radioactivity, Basic concepts of Fission and Fusion.

Unit IV
The Solar system and the Universe: The Planets, The Moon, Comets, Meteors, The Sun, Solar Energy, Solar Atmosphere, Sunspots, The Stars, Apparent magnitude, Absolute magnitude and stellar distances, Stellar Evolution, The Universe, Milky Way Galaxy, Cosmic Rays, Other galaxies, The expanding universe.

UNIVERSITY OF JAMMU

Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Multi-disciplinary
Course Name:	Physics in Daily Life	Course Code:	UMDPYT103
Credits:	3	L T P:	3-0-0
Contact Hrs.	45		
Duration of Exam	3 Hours	End Semester Exam	60 Marks
		Mid Semester Exam	15 Marks
Mid Semester Exam shall be conducted after completing 50% of syllabus.			

Text and Reference Books:

1. Physics for future presidents by Richard A. Muller (w.w. Norton and Co.)
2. Abhyankar K. D., Astrophysics: Stars and Galaxies (Universities Press, 2009).
3. Nuclei and Radioactivity by G.R. Choppin (W.A. Bejamin, N.Y. York)
4. Space, Time and Gravitation by A.S. Eddington (Cambridge University Press).
5. Work, Energy and Power by Sarah Allen.
6. The Casual Sky Observer's Guide by Rony De Laet Springer 2012.

Note for paper setters for End Semester Examination:
The question paper will be of 60 marks. There shall be 2 sections in the question paper with pattern as follows:
Section A shall comprise of 4 short answer type questions (of 3 marks each) with one question from each unit. The students have to attempt all the questions from Section A.
Section B shall comprise of a total of 8 questions with two questions selected from each unit. Each question shall be of 12 marks. The students have to attempt 4 questions by selecting only one question from each unit.
The numerical problems should not exceed more than 20% of the maximum marks.

Note for paper setters for Mid Semester Examination: The Mid Term Examination shall be conducted by the course coordinator after completion of 50% of the syllabus.
The question paper will be of 15 marks. There shall be 2 sections in the question paper with pattern as follows :
Section-A shall comprise of 3 questions (of 4 marks each) and the students are required to attempt any two questions.
Section-B shall comprise of 2 questions (of 7 marks each) and the students are required to attempt any one question.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2022, 2023, 2024

Semester :	I	Type:	Skill Enhancement Course
Course Name:	Physics Lab Skills	Course Code:	USEPYT104
Credits:	2	L T P:	2-0-0
Contact Hrs.	30		
Duration of Exam	2½ Hours	End Semester Exam	40 Marks
		Mid Semester Exam	10 Marks
Mid Semester Exam shall be conducted after completing 50% of syllabus.			

Course Outcomes:

The aim of this course is to enable the students to be familiar with various mechanical and electrical tools through hands-on mode

Unit-I

Measuring units, conversion to SI and CGS, familiarization with meterscale, Vernier calliper, Screw gauge and their utility, measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc.

Unit-II

Capacitance, parallel plate capacitor, Faraday's laws of electromagnetic induction, Lenz's law, inductance, reactance and impedance, LC oscillations (qualitative idea only), LCR series and parallel circuits, step up and step down transformers.

Unit-III

Electronic measurements: analog and digital voltmeter, analog and digital ammeter, millimeter, analog and digital, measurement of resistance, capacitance, voltage and current using digital multimeter.

Note for paper setters for End Semester Examination: The question paper will be of 40 marks. There shall be 2 sections in the question paper with pattern as follows:

Section A shall comprise of 4 short answer type questions (of 2½ marks each) with atleast one question from each unit. The students have to attempt all questions from Section A.

Section B shall comprise of a total of 6 questions with two questions selected from each unit. Each question shall be of 10 marks. The students have to attempt 3 questions by selecting only one question from each unit.

UNIVERSITY OF JAMMU

Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Major
Course Name:	Electrostatics and Magnetism	Course Code:	UMJPYT201
Credits:	3(Theory) + 1(Practical)	L T P:	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Thoery) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	For Practicals : Final Exam : 15 Marks Continuous Assessment: 10 Marks

Syllabus for Theory (3 Credits)

Note : The Mid Semester Examination shall be conducted after completing 50% of syllabus.

Course learning outcomes:

- *Demonstrate Gauss's law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.*
- *Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.*
- *Apply Gauss's law of electrostatics to solve a variety of problems.*
- *Describe the magnetic field produced by magnetic dipoles and electric currents.*
- *Explain Faraday's law and Maxwell's laws to articulate the relationship between electric and magnetic fields.*
- *Understand the dielectric properties, magnetic properties of materials and phenomena of electromagnetic induction.*
- *Understand the properties of EM Waves*

Unit-I

Electrostatics: Scalar and Vector fields, line, surface and volume integral, del operator, gradient and its physical significance, divergence and its physical significance, solenoidal fields, curl and its physical significance, irrotational fields. Gauss's divergence theorem and Stoke's theorem, Concept of electric field, electric potential, relation between electric intensity and potential, electric dipole and dipole moment, Electric flux , Gauss's law of electrostatics (integral and differential form)

Semester :	II	Type:	Major
Course Name:	Electrostatics and Magnetism	**Course Code:**	UMJPYT201
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Thoery) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	For Practicals : Final Exam : 15 Marks Continuous Assessment: 10 Marks

Unit-II

Dielectrics: Non-polar molecules, polar molecules, polar and non-polar molecules in an electric field, polarization, polarization charges and polarization vector, electric susceptibility, displacement vector, electric field in dielectric, Gauss's law in dielectrics (integral and differential form), Relation between three electric vectors: displacement vector (D), electric vectors (E), and polarization vector (P).

Unit-III

Magnetostatics: Concept of magnetic field, Biot-Savart's law, application of Biot-Savart's law, Ampere's circuital law (integral and differential form) and its limitations, divergence of magnetic field, magnetic scalar and vector potentials, divergence of vector potential, current loop as a magnetic dipole, relation between magnetic dipole moment and angular momentum, magnetization vector , magnetisation current, free and bound currents, relation between magnetic field (**B**), magnetism intensity(**H**) and magnetization vector (**M**), magnetic susceptibility and permeability.

Unit-IV

Time Varying Fields: integral and differential forms of Faraday's laws of electromagnetic induction, self and mutual inductance, self inductance of a solenoid, mutual inductance of two solenoids, reciprocity theorem of mutual inductance, relation between self and mutual inductances, coefficient of coupling, energy stored in magnetic field, Maxwell's equations (differential and integral forms) and their interpretation.

**Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025**

Semester :	II	Type:	Major
Course Name:	Electrostatics and Magnetism	**Course Code:**	UMJPYT201
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Thoery) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	For Practicals : Final Exam : 15 Marks Continuous Assessment: 10 Marks

Note for paper setters for End Semester Examination:
The question paper will be of 60 marks. There shall be 2 sections in the question paper with pattern as follows:
Section A shall comprise of 4 short answer type questions (of 3 marks each) with one question from each unit. The students have to attempt all the questions from Section A.
Section B shall comprise of a total of 8 questions with two questions selected from each unit. Each question shall be of 12 marks. The students have to attempt 4 questions by selecting only one question from each unit.
The numerical problems should not exceed more than 20% of the maximum marks.

Note for paper setters for Mid Semester Examination:
The Mid Term Examination shall be conducted by the course coordinator after completion of 50% of the syllabus.
The question paper will be of 15 marks. There shall be 2 sections in the question paper with pattern as follows :
Section-A shall comprise of 3 questions (of 4 marks each) and the students are required to attempt any two questions.
Section-B shall comprise of 2 questions (of 7 marks each) and the students are required to attempt any one question.

Text and Reference Books:
1. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education..
2. Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford Univ. Press. .
3. Electricity and Magnetism, D.C. Tayal, 1988, Himalaya Publishing House.
4. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
5. Electromagnetic Fields and Waves, P.Lorrain & D. Corson, W.H. Freeman & Co.
6. Introduction to Electrodynamics, D.J.Griffiths, 3rd Edition, 1998, Benjamin Cummings.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Major
Course Name:	Electrostatics and Magnetism	Course Code:	UMJPYT201
Credits:	3(Theory) + 1(Practical)	L T P:	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Thoery) 2½ Hrs (Practicals)		

For Theory :	For Practicals :
End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	Final Exam : 15 Marks Continuous Assessment: 10 Marks

Syllabus for Practicals (C.No. UMJPYT201)

Note : Perform any five of the following experiments as per the availability of equipments/ apparatus.

List of Experiments:

1. To determine a low resistance by Carey Foster's Bridge with/without calibration
2. To determine the ratio of two capacitances by de Sauty's bridge.
3. To determine self-inductance of a coil by Anderson's bridge using AC.
4. To determine self-inductance of a coil by Rayleigh's method.
5. To determine the impedance of Series LCR circuits
6. To determine the frequency of ac mains using electrical vibrator
7. To find the frequency of a tuning fork using Sonometer
8. To find the capacitance of a capacitor using electrical vibrator

Note: *The concerned department may add some more practicals on the availability of some new equipments related to the course.*

Pattern of Exam: Continuous Assessment: 10 marks
                 Final Examination: 15 marks

Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Major
Course Name:	Electrostatics and Magnetism	Course Code:	UMJPYT201
Credits:	3(Theory) + 1(Practical)	L T P:	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Thoery) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	For Practicals : Final Exam : 15 Marks Continuous Assessment: 10 Marks

Text Book sand References:

1. Geeta Sanon, B.Sc. Practical Physics, (R. Chand &Co).
2. B. L. Worsnhop and H.T. Flint, Advanced Practical Physics, (Asia Publishing House, New Delhi).
3. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, (Kitab Mahal, New Delhi).
4. D.P. Khandewal, A Laboratory Manual of Physics for Undergraduate Classes, (Vani Publication House, New Delhi).

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Minor
Course Name:	Electromagnetism	**Course Code:**	UMIPYT202
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks	For Practicals : Final Exam : 15 Marks Continuous Assessment: 10 Marks

Syllabus for Theory (3 Credits)

Note : The Mid Semester Examination shall be conducted after completing 50% of syllabus.

Course learning outcomes:
- *Understanding of Gauss's law for electrostatics and its application.*
- *Knowledge about the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.*
- *Explanation of the magnetic field produced by magnetic dipoles and electric currents.*
- *Explain Faraday's law and Maxwell's laws to articulate the relationship between electric and magnetic fields.*
- *Understand the dielectric properties, magnetic properties of materials and phenomena of electromagnetic induction.*
- *Understand the properties of EM Waves*

Unit- I

Review of vector algebra, Scalar and vector fields, Gradient of a scalar field and its physical interpretation, Divergence of a vector field and its physical significance, solenoidal field, Vector integration, Line, surface and volume integrals of vector fields, Gauss divergence theorem, Curl of a vector field and its significance, Stoke's theorem of vectors, irrotational vector field, Vector identities.

Unit- II

Electric flux, Differential and integral Gauss's theorem of electrostatics, electric potential, electric potential as line integral of electric field, potential due to a point charge, electric dipole, Energy per unit volume in electrostatic field.

Polar and non-polar molecules in an electric field, polarization and polarization vector, electric susceptibility, electric field in dielectric, Gauss's law in dielectrics, Relation between three electric vectors: displacement vector (D), electric field (E), and polarization vector (P).

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Minor
Course Name:	Electromagnetism	**Course Code:**	UMIPYT202
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		

For Theory : **End Semester Exam : 60 Marks** **Mid Semester Exam: 15 Marks**	**For Practicals :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**

Unit-III

Concept of magnetic field, Biot-Savart's law, application of Biot-Savart's law, Ampere's circuital law (integral and differential form) and its limitations, modified form of ampere's circuital law, displacement current, divergence of magnetic field, magnetic scalar and vector potentials, divergence of vector potential, Integral and differential forms of Faraday's laws of electromagnetic induction, Self inductance of a solenoid, Mutual inductance of two solenoids, Energy stored in magnetic field.

Unit-IV

Maxwell equations and their interpretation, Poynting vector, Poynting theorem and its differential form. Electromagnetic waves in vacuum; The wave equations for $\vec{E}$ and $\vec{B}$, Monochromatic plane electromagnetic waves and their transverse nature, Electromagnetic waves in conductors; Modified wave equations, Skin Depth, and Characteristic impedance.

Reference Books:

1. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education..
2. Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford Univ. Press. .
3. Electricity and Magnetism, D.C. Tayal, 1988, Himalaya Publishing House.
4. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
5. Electromagnetic Fields and Waves, P.Lorrain & D. Corson, W.H. Freeman & Co.
6. Introduction to Electrodynamics, D.J.Griffiths, 3rd Edition, 1998, Benjamin Cummings.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Minor
Course Name:	Electromagnetism	Course Code:	UMIPYT202
Credits:	3(Theory) + 1(Practical)	L T P:	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		
For Theory : End Semester Exam : 60 Marks Mid Semester Exam: 15 Marks		**For Practicals :** Final Exam : 15 Marks Continuous Assessment: 10 Marks	

Note for paper setters for End Semester Examination:

The question paper will be of 60 marks. There shall be 2 sections in the question paper with pattern as follows:

Section A shall comprise of 4 short answer type questions (of 3 marks each) with one question from each unit. The students have to attempt all the questions from Section A.

Section B shall comprise of a total of 8 questions with two questions selected from each unit. Each question shall be of 12 marks. The students have to attempt 4 questions by selecting only one question from each unit.

Note for paper setters for Mid Semester Examination:

The Mid Term Examination shall be conducted by the course coordinator after completion of 50% of the syllabus.

The question paper will be of 15 marks. There shall be 2 sections in the question paper with pattern as follows :

Section-A shall comprise of 3 questions (of 4 marks each) and the students are required to attempt any two questions.

Section-B shall comprise of 2 questions (of 7 marks each) and the students are required to attempt any one question.

Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Minor
Course Name:	Electromagnetism	**Course Code:**	UMIPYT202
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-0 (Theory) 0-0-2 (Pract)
Contact Hrs.	45 (Theory) + 30 (Pract.)		
Duration of Exam	3 Hours (Theory) 2½ Hrs (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Semester Exam: 15 Marks**		**For Practicals :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Syllabus for Practicals (C.No. UMIPYT202)

Note : **Perform any five of the following experiments as per the availability of equipments/ apparatus.**

List of Experiments:

1. To determine self-inductance of a coil by Anderson's bridge using AC.
2. To determine self-inductance of a coil by Rayleigh's method.
3. To find impedance of a series LCR circuit
4. To compare capacitances of two capacitors using De'Sauty's bridge.
5. To study the variation of magnetic field with distance along the axis of a circular coil carrying current.
6. To study the Characteristics of a Series RC Circuit.
7. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor
8. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q.
9. To determine a Low Resistance by Carey Foster's Bridge
10. To find the capacitance of a capacitor using electric vibrator.

Note: The concerned department may add some more practical on the availability of some new practical as per Lab title.

Pattern of Exam: Continuous Assessment: 10 marks

Final Examination: 15 marks

5. **Text and Reference Books:**
   1. B. Sc Practical Physics by C. L. Arora.
   2. Practical Physics by G L Squires Cambridge University Press
   3. Advanced Practical Physics for Students by Worsnhop and Flint
   4. Practical Physics by R K Shukla
   5. B.Sc Practical Physics by Harnam Singh
   6. B.Sc. Practical Physics(R.Chand and Co.) by Geeta Sanon

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for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Multi-disciplinary
Course Name:	Renewable Energy and Energy Harvesting	Course Code:	UMDPYT203
Credits:	3	L T P:	3-0-0
Contact Hrs.	45		
Duration of Exam	3 hours	End Semester Exam	60 marks
		Mid Semester Exam	15 marks
Mid Semester Exam shall be conducted after completing 50% of syllabus.			

Course Outcomes:
The aim of this course is to enable the students to have knowledge about various sources of energy and their harvesting

Unit-I

Energy sources: Energy concept-sources in general, its significance & necessity, Classification of energy sources: Primary and Secondary energy, Commercial and Non-commercial energy, Renewable and Non-renewable energy, Importance of renewable energy resources.

Unit-II

Conventional energy sources: Fossil fuels & Nuclear energy- production & extraction, usage rate and limitations. Impact on environment and their issues & challenges, Overview of Indian & world energy scenario with latest statistics- consumption & necessity. Need of eco-friendly & green energy.

Unit-III

Renewable energy sources: Need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, principle of generation of Hydroelectricity.

Unit-IV

Solar energy: Solar Energy-Key features and its importance, Merits & demerits of solar energy, Applications of solar energy. Solar water heater, solar cooker, solar green houses, solar cell - brief discussion of each. Importance and characteristics of photovoltaic (PV) systems, and Sun-tracking systems.

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for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Multi-disciplinary
Course Name:	Renewable Energy and Energy Harvesting	**Course Code:**	UMDPYT203
Credits:	3	**L T P:**	3-0-0
Contact Hrs.	45		
Duration of Exam	**3 hours**	**End Semester Exam**	**60 marks**
		Mid Semester Exam	**15 marks**
Mid Semester Exam shall be conducted after completing 50% of syllabus.			

Reference Books

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assessment Handbook, 2009
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
7. http://en.wikipedia.org/wiki/Renewable_energy

Note for paper setters for End Semester Examination:
The question paper will be of 60 marks. There shall be 2 sections in the question paper with pattern as follows:
Section A shall comprise of 4 short answer type questions (of 3 marks each) with one question from each unit. The students have to attempt all the questions from Section A.
Section B shall comprise of a total of 8 questions with two questions selected from each unit. Each question shall be of 12 marks. The students have to attempt 4 questions by selecting only one question from each unit.

Note for paper setters for Mid Semester Examination:
The Mid Term Examination shall be conducted by the course coordinator after completion of 50% of the syllabus.
The question paper will be of 15 marks. There shall be 2 sections in the question paper with pattern as follows :
Section-A shall comprise of 3 questions (of 4 marks each) and the students are required to attempt any two questions.
Section-B shall comprise of 2 questions (of 7 marks each) and the students are required to attempt any one question.

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**Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025**

Semester :	II	Type:	Skill Enhancement Course
Course Name:	Physics Workshop Skills	**Course Code:**	USEPYT204
Credits:	2	**L T P:**	2-0-0
Contact Hrs.	30		
Duration of Exam	2½ Hours	**End Semester Exam**	**40 Marks**
		Mid Semester Exam	**10 Marks**
Mid Semester Exam shall be conducted after completing 50% of syllabus.			

Course Outcomes:
The aim of this course is to enable the students to be familiar with Mechanical, Electrical and Electronic skills.

UNIT-I

Mechanical Skill: Concept of workshop practice. Overview of manufacturing methods: casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Smoothening of cutting edge of sheet using file. Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. Make funnel using metal sheet.

UNIT-II

Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.

UNIT-III

Introduction to prime movers: Mechanism, gear system, wheel, Fixing of gears with motor axel. Lever mechanism, Lifting of heavy weight using lever, braking systems, pulleys, working principle of power generation systems. Demonstration of pulley experiment

Reference Books:
•A text book in Electrical Technology - B L Theraja – S. Chand and Company.
• Performance and design of AC machines – M.G. Say, ELBS Edn.
• Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt. Ltd.
• Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]
• New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN: 0861674480]

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2023, 2024, 2025

Semester :	II	Type:	Skill Enhancement Course
Course Name:	Physics Workshop Skills	**Course Code:**	USEPYT204
Credits:	2	**L T P:**	2-0-0
Contact Hrs.	30		
Duration of Exam	2½ Hours	**End Semester Exam**	**40 Marks**
		Mid Semester Exam	**10 Marks**
Mid Semester Exam shall be conducted after completing 50% of syllabus.			

Note for paper setters for End Semester Examination: The question paper will be of 40 marks. There shall be 2 sections in the question paper with pattern as follows:

Section A shall comprise of 4 short answer type questions (of 2½ marks each) with atleast one question from each unit. The students have to attempt all questions from Section A.

Section B shall comprise of a total of 6 questions with two questions selected from each unit. Each question shall be of 10 marks. The students have to attempt 3 questions by selecting only one question from each unit.