UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A ++' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section
Email: academicsectionju14@gmail.com

NOTIFICATION
(25/August/Adp./35)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the revised syllabus and Courses of studies of the subject of **Physics** for semester I, II and III for **Four Year Undergraduate Programme** as per **Nep-2020 (as given in annexure)** for the **Regular Candidates** for the examinations to be held in the years as per the details given below:-

Subject	Semester	Existing Code Course	New Code Course	For the examinations to be held in the year	Change of %
Physics	Semester-I	UMDPYT-103	UMDPYT-106	Dec. 2025, 2026 and 2027	100%
		USEPYT-104	USEPYT-111	Dec. 2025, 2026 and 2027	100%
	Semester-II	UMDPYT-203	UMDPYT-206	May 2026, 2027 and 2028	100%
		USEPYT-204	USEPYT-211	May 2026, 2027 and 2028	100%
	Semester-III	UMJPYT-301	UMJPYT-301	Dec. 2026, 2027 and 2028	10%
		UMDPYT-304	UMDPYT-306	Dec. 2026, 2027 and 2028	100%
		USEPYT-305	USEPYT-311	Dec. 2026, 2027 and 2028	100%

The Syllabi of the courses is also available on the University website: www.jammuuniversity.ac.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/25/ 6616-42
Dated: 29/8/25

Copy for information and necessary action to:

1. Dean, Faculty of **Science**
2. HOD/Convener, Board of Studies in **Physics**
3. All members of the Board of Studies
4. Sr. P.A.to the Controller of Examinations
5. Director, Centre for IT Enabled services and Management, University of Jammu for information and for uploading on University Website.
6. C.A. to the Controller of Examinations
7. Director, Computer Centre, University of Jammu.
8. Deputy Registrar/Asst. Registrar (Conf./Exam UG/Exam. Non Prof.)

Joint Registrar (Academic) 20/8/25

17/8 19/8/25

Annexure-III

UNIVERSITY OF JAMMU

LIST OF COURSES OF PHYSICS OF SEMESTERS I, II & III FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) UNDER CBCS AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2025 onwards

UG Syllabi 2025 Onwards (Upto 3 Semester)																
S. No.	Course No.	Course Title	No. of Credits			Course Type	Marks		Nature of Course				SAWAM/ MOOC	Vocational Course	Research Project / Summer Internship/ Dissertation
				Credit Level	Credit Points	Core/Elective/ Any other	Theory	Practical	Global	National	Regional	Skill			
1	UMJPYT101	Mechanics	04	4.5	18	Major	75	25	Global						
2	UMIPYT102	Kinematics	04	4.5	18	Minor	75	25	Global						
3	UMDPYT106	Physics in Daily Life-I	03	4.5	13.5	MD	75		Global						
4	USEPYT111	Physics Lab Skills	03	4.5	13.5	SE	25	50	Global			Skill			
5	UMJPYT201	Electrostatics and Magnetism	04	4.5	18	Major	75	25	Global						
6	UMIPYT202	Electromagnetism	04	4.5	18	Minor	75	25	Global						
7	UMDPYT206	Physics in Daily Life-II	03	4.5	13.5	MD	75		Global						
8	USEPYT211	Physics Workshop Skills	03	4.5	13.5	SE	25	50	Global			Skill			
9	UMJPYT301	Electronics-I	04	5	20	Major	75	25	Global						
10	UMJPYT302	Heat and Thermodynamics	04	5	20	Major	75	25	Global						
11	UMIPYT306	Basic Electronics	04	5	20	Minor	75	25	Global						
12	UMDPYT304	Physics in Daily Life-III	03	5	15	MD	75		Global						
13	USEPYT311	Photography and video – audiography	03	5	15	SE	25	50	Global			Skill			

Annexure-IV

UNIVERSITY OF JAMMU

PERCENTAGE CHANHGE OF SYLLABI OF PHYSICS OF SEMESTERS I, II & III FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) UNDER CBCS AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2025 onwards

S.No.	Course No.	Course Title	% of Syllabus Modified
1	UMJPYT101	Mechanics	NO Change
2	UMIPYT102	Kinematics	NO Change
3	UMDPYT106	Physics in Daily Life-I	100%
4	USEPYT111	Physics Lab Skills	100%
5	UMJPYT201	Electrostatics and Magnetism	NO Change
6	UMIPYT202	Electromagnetism	NO Change
7	UMDPYT206	Physics in Daily Life-II	100%
8	USEPYT211	Physics Workshop Skills	100%
9	UMJPYT301	Electronics-I	Less than 10%
10	UMJPYT302	Heat and Thermodynamics	NO Change
11	UMIPYT303	Basic Electronics	NO Change
12	UMDPYT306	Physics in Daily Life-III	100%
13	USEPYT311	Photography and video –audiography	100%

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SYLLABI OF PHYSICS FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2025

List of Major, Minor, Multi-disciplinary and Skill Enhancement Courses in Physics for 1st Semester of FYUGP (Four Year Undergraduate Program) as per NEP-2020

SEMESTER-I

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks	%age Change
					Theory		Practical			
					Mid Semester	End Semester	Assessment	Exam		
1.	Major	UMJPYT101	Mechanics	3Th + 1P	15	60	10	15	100	No change
2.	Minor	UMIPYT102	Kinematics	3Th + 1P	15	60	10	15	100	No change
3.	Multi-disciplinary	UMDPYT106	Physics in Daily Life-I	3	15	60	------	-------	75	100%
4.	Skill Enhancement	USEPYT111	Physics Lab Skills	1 Th + 2P	25		50		75	100%

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SYLLABI OF PHYSICS FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2025

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

SEMESTER-II

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks	%age change
					Theory		Practical			
					Mid Semester	End Semester	Assessment	Exam		
1.	Major	UMJPYT201	Electrostatics and Magnetism	3Th + 1P	15	60	10	15	100	No change
2.	Minor	UMIPYT202	Electromagnetism	3Th + 1P	15	60	10	15	100	No change
3.	Multi-disciplinary	UMDPYT206	Physics in Daily Life-II	3	15	60	------	------	75	100%
4.	Skill Enhancement	USEPYT211	Physics Workshop Skills	1Th + 2P	25		50		75	100%

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SYLLABI OF PHYSICS FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2025

List of Major, Minor, Multi-disciplinary and Skill Enhancement Courses in Physics for 3rd Semester of FYUGP (Four Year Undergraduate Program) as per NEP-2020

SEMESTER-III

S. No	Course Type	Course No.	Course Title	Credits	Marks				Total Marks	%age change
					Theory		Practical / Tutorial			
					Mid Semester	End Semester	Assessment	Exam		
1.	Major	UMJPYT301	Electronics -I	3Th+1P	15	60	10	15	100	Less than 10%
2.	Major	UMJPYT302	Heat and Thermodynamics	3Th+1T	15	60	10	15	100	No change
3.	Minor	UMIPYT303	Basic Electronics	3Th+1P	15	60	10	15	100	No change
4.	Multi-disciplinary	UMDPYT306	Physics in Daily Life-III	3Th	15	60	------	-------	75	100%
5.	Skill Enhancement	USEPYT311	Photography and video – audiography	1Th+2P	25		50		75	100%

Course Matrix and Syllabus
(Semesters I, II and III)

Four Year Undergraduate B.Sc. Program in Physics
(*w.e.f.* Academic Session 2025-2028)

Learning Outcomes based Curriculum Framework
(LOCF)

As per *National Education Policy (NEP-2020)*

Offered By
Colleges affiliated to University of Jammu

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SYLLABI OF PHYSICS FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) UNDER CBCS AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2025

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

SEMESTER-I

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Ma
					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	UM-DPYT106	Physics in Daily Life-I	3	15	60	------	-------	75
4.	Skill Enhancement	USEPYT111	Physics Lab Skills	1 Th + 2P	25		50		75

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	I	**Type:**	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	I	**Type:**	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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.

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.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	I	**Type:**	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	I	**Type:**	Major
Course Name:	Mechanics	**Course Code:**	UMJPYT101
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	I	**Type:**	Minor
Course Name:	Kinematics	**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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 2025, 2026 and 2027

Semester :	I	**Type:**	Minor
Course Name:	Kinematics	**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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 moduli, 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.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	I	**Type:**	Minor
Course Name:	Kinematics	**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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.
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 2025, 2026 and 2027

Semester :	I	**Type:**	Minor
Course Name:	Kinematics	**Course Code:**	UMIPYT102
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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**	

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 2025, 2026 and 2027

Semester :	I	**Type:**	Multi-disciplinary
Course Name:	Physics in Daily Life-I	**Course Code:**	UMDPYT106
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

Physics of Measurement: Physical quantities, Units and standards in Physics, International System of Units, Standards of Time, Length and Mass, Precision and Significant Figures, Errors in measurement (types, sources and minimizing techniques). Overview of Electronic measurement devices (voltmeter, ammeter and multimeter).

Unit-II

Everyday Physics from Circuits to Electric Generators: Basics of electricity (Ohm's law in macroscopic form and microscopic) Magnetic Force and Magnetism (types and magnetic materials), Lorentz Force, Electric Generator (principle, components and block diagram) and Transformer (working principle, types and components).

Unit-III

Impacts of Nuclear Physics on Daily Life: Atomic Nucleus, Structure and behaviour, Binding Energy and Nuclear Stability, Radioactivity, Laws of Radioactive Decay, Reaction mechanism in controlled and uncontrolled nuclear chain reactions, Nuclear Fission and Nuclear Fusion, Nuclear Power Plants (components, working and advantages).

Unit IV

Space Science in Daily Life: Planets and Gravitational Force, Kepler's Laws of Planetary Motion (Qualitative idea only), Geosynchronous Satellite, Description of Satellites for communication through block diagram (mobile phone networks and internet access), Outline of Global Positioning System (GPS), Satellites for weather forecasting (introduction of key features and orbits).

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	I	**Type:**	Multi-disciplinary
Course Name:	Physics in Daily Life-I	**Course Code:**	UMDPYT106
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. "Introduction to Measurements and Instrumentation" (PHI Publications) by Arun K. Ghosh.
2. "Fundamentals of Physics" (Part 1, Wiley Publications) by Halliday, Resnick, and Walker.
3. "Physics for Scientists and Engineers" (Volume 1, Cengage Learning Publications) by Raymond A. Serway and John W. Jewett.
4. "A text Book of Electrical Technology" (S. Chand Pub.) by B.L. Theraja and A.K. Theraja.
5. "Atomic and Nuclear Physics" (S.Chand & Company) by N. Subrahmanyam and Brij Lal.
6. "Nuclear Physics: Principles and Applications" (Wiley Publications) by John Lilley.
7. "Structure of the Universe" (Oxford University Press) by Jayant Vishnu Narlikar.
8. "Fundamentals of Remote Sensing and GIS" (Universities Press) by George Joseph.
9. "Satellite Technology: Principles and Applications" (Wiley Publications) by Anil K. Maini and Varsha Agrawal.

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 2025, 2026 and 2027

Semester :	I	**Type:**	Skill Enhancement Course
Course Name:	Physics Lab Skills	**Course Code:**	USEPYT111
Credits:	3	**L T P:**	1-0-2
Contact Hrs.	Theory-15 hours Practical - 60 hours	**Duration of Exam**	Theory- 1½ Hour Practical - 3 Hours
For Theory : **Mid Semester Exam : 25 Marks**		**For Practicals :** **Final Exam : 50 Marks**	

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: Multimeter (Description with block diagram), analog and digital voltmeter, analog and digital ammeter, measurement of resistance, capacitance, voltage and current using digital multimeter.

References:

- Measurement and Instrumentation: A.K. Sawhney
- Electronic Instrumentation and Measurement Techniques: William D. Cooper, Albert D. Helfrick

NOTE FOR PAPER SETTING

***Note for paper setters for End Semester Examination*: Part -1**

The question paper will be of 25 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 at least one question from each unit. The students have to attempt all the questions from Section A.

Section B shall comprise of a total of **6** questions with two questions from each unit. Each question shall be of **05** marks. The students have to attempt **3** questions by selecting only one question from each unit.

EVALUATION OF SKILLS: ***Final Examination Part-2***

The evaluation off skills will be internal. The examination of skills shall be of 50 marks. The evaluation of skills will be done internally through the board of 03 members (including the trainer of the course).

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SYLLABI OF PHYSICS FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) UNDER CBCS AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2026

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

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	Electromagnetism	3Th + 1P	15	60	10	15	100
3.	Multi-disciplinary	UM-DPYT206	Physics in Daily Life-II	3	15	60	------	------	75
4.	Skill Enhancement	USEPYT211	Physics Workshop Skills	1Th + 2P	25		50		75

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2026, 2027 and 2028

Semester :	II	**Type:**	Major
Course Name:	Electrostatics and Magnetism	**Course Code:**	UMJPYT201
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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:

- *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).

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2026, 2027 and 2028

Semester :	II	**Type:**	Major
Course Name:	Electrostatics and Magnetism	**Course Code:**	UMJPYT201
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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-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.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2026, 2027 and 2028

Semester :	II	**Type:**	Major
Course Name:	Electrostatics and Magnetism	**Course Code:**	UMJPYT201
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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.
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 2026, 2027 and 2028

Semester :	II	**Type:**	Major
Course Name:	Electrostatics and Magnetism	**Course Code:**	UMJPYT201
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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. 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

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2026, 2027 and 2028

Semester :	II	**Type:**	Major
Course Name:	Electrostatics and Magnetism	**Course Code:**	UMJPYT201
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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 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 2026, 2027 and 2028

Semester :	II	**Type:**	Minor
Course Name:	Electromagnetism	**Course Code:**	UMIPYT202
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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 2026, 2027 and 2028

Semester :	II	**Type:**	Minor
Course Name:	Electromagnetism	**Course Code:**	UMIPYT202
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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

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 2026, 2027 and 2028

Semester :	II	**Type:**	Minor
Course Name:	Electromagnetism	**Course Code:**	UMIPYT202
Credits:	3(Theory) + 1(Practical)	**L T P:**	3-0-1
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.

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2026, 2027 and 2028

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

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

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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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in May 2026, 2027 and 2028

Semester :	II	**Type:**	Multi-disciplinary
Course Name:	Physics in Daily Life-II	**Course Code:**	UMDPYT206
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

Physics of Measurement: Physical quantities, Units and standards in Physics, International System of Units, Standards of Time, Length and Mass, Precision and Significant Figures, Errors in measurement (types, sources and minimizing techniques). Overview of Electronic measurement devices (voltmeter, ammeter and multimeter).

Unit-II

Everyday Physics from Circuits to Electric Generators: Basics of electricity (Ohm's law in macroscopic form and microscopic) Magnetic Force and Magnetism (types and magnetic materials), Lorentz Force, Electric Generator (principle, components and block diagram) and Transformer (working principle, types and components).

Unit-III

Impacts of Nuclear Physics on Daily Life: Atomic Nucleus, Structure and behaviour, Binding Energy and Nuclear Stability, Radioactivity, Laws of Radioactive Decay, Reaction mechanism in controlled and uncontrolled nuclear chain reactions, Nuclear Fission and Nuclear Fusion, Nuclear Power Plants (components, working and advantages).

Unit IV

Space Science in Daily Life: Planets and Gravitational Force, Kepler's Laws of Planetary Motion (Qualitative idea only), Geosynchronous Satellite, Description of Satellites for communication through block diagram (mobile phone networks and internet access), Outline of Global Positioning System (GPS), Satellites for weather forecasting (introduction of key features and orbits).

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	II	**Type:**	Multi-disciplinary
Course Name:	Physics in Daily Life-II	**Course Code:**	UMDPYT206
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. "Introduction to Measurements and Instrumentation" (PHI Publications) by Arun K. Ghosh.
2. "Fundamentals of Physics" (Part 1, Wiley Publications) by Halliday, Resnick, and Walker.
3. "Physics for Scientists and Engineers" (Volume 1, Cengage Learning Publications) by Raymond A. Serway and John W. Jewett.
4. "A text Book of Electrical Technology" (S. Chand Pub.) by B.L. Theraja and A.K. Theraja.
5. "Atomic and Nuclear Physics" (S.Chand & Company) by N. Subrahmanyam and Brij Lal.
6. "Nuclear Physics: Principles and Applications" (Wiley Publications) by John Lilley.
7. "Structure of the Universe" (Oxford University Press) by Jayant Vishnu Narlikar.
8. "Fundamentals of Remote Sensing and GIS" (Universities Press) by George Joseph.
9. "Satellite Technology: Principles and Applications" (Wiley Publications) by Anil K. Maini and Varsha Agrawal.

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 May 2026, 2027 and 2028

Semester :	II	**Type:**	Skill Enhancement Course
Course Name:	Physics Workshop Skills	**Course Code:**	USEPYT211
Credits:	3	**L T P:**	1-0-2
Contact Hrs.	Theory-15 hours Practical - 60 hours	**Duration of Exam**	Theory- 1½ Hour Practical - 3 Hours
For Theory : **Mid Semester Exam : 25 Marks**		**For Practicals :** **Final Exam : 50 Marks**	

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.

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 2026, 2027 and 2028

Semester :	II	**Type:**	Skill Enhancement Course
Course Name:	Physics Workshop Skills	**Course Code:**	USEPYT211
Credits:	3	**L T P:**	1-0-2
Contact Hrs.	Theory-15 hours Practical - 60 hours	**Duration of Exam**	Theory- 1½ Hour Practical - 3 Hours
For Theory : **Mid Semester Exam : 25 Marks**		**For Practicals :** **Final Exam : 50 Marks**	

NOTE FOR PAPER SETTING

***Note for paper setters for End Semester Examination*: Part -1**

The question paper will be of 25 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 at least one question from each unit. The students have to attempt all the questions from Section A.

Section B shall comprise of a total of **6** questions with two questions from each unit. Each question shall be of **05** marks. The students have to attempt **3** questions by selecting only one question from each unit.

EVALUATION OF SKILLS: ***Final Examination Part-2***

The evaluation off skills will be internal. The examination of skills shall be of 50 marks. The evaluation of skills will be done internally through the board of 03 members (including the trainer of the course).

UNIVERSITY OF JAMMU

SYLLABI OF PHYSICS FOR FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) UNDER CBCS AS PER NEP-2020 W.E.F. ACADEMIC SESSION 2026

List of Major, Minor, Multi-disciplinary and Skill Enhancement Courses in Physics for 3rd Semester of FYUGP (Four Year Undergraduate Program) as per NEP-2020

SEMESTER-III

S. No	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical / Tutorial		
					Mid Semester	End Semester	Assessment	Exam	
1.	Major	UMJPYT301	Electronics-I	3Th+1P	15	60	10	15	100
2.	Major	UMJPYT302	Heat and Thermodynamics	3Th+1T	15	60	10	15	100
3.	Minor	UMIPYT303	Basic Electronics	3Th+1P	15	60	10	15	100
4.	Multi-disciplinary	UMDPYT306	Physics in Daily Life-III	3Th	15	60	------	-------	75
5.	Skill Enhancement	USEPYT311	Photography and video – audiography	1Th+2P	25		50		75

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Electronics-I	**Course Code:**	UMJPYT301
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : End Semester Exam : 60 Marks Mid Term 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:

After completing this course content, student will be able to understand:

- Basic components and Circuit analysis
- Basics of Semiconductors and semiconductor diode as device and its applications

Unit-I

Basic concepts and components:

Concepts of electrical signal: analog, digital and their graphical and mathematical representation; signal sources: independent sources (voltage and current sources), dependent sources; discrete and integrated circuits, Circuit components: Resistors, Inductors and Capacitors (purpose in the electrical circuit, materials, and equivalent circuit) potentiometers.

Unit-II

Networks and theorems: DC and AC Circuit analysis of RC, RL circuits and RLC series and resonant circuits. (DC Transient analysis: RC Circuit- charging and discharging with initial charge, RL circuit with initial charge, Time constant, DC response of series RLC circuits; AC circuit analysis: LCR circuits- series, condition of resonance, resonant frequency, bandwidth and Q-factor).

Circuit Analysis: Superposition, Thevenin's, Norton's Maximum power transfer and Reciprocity theorems, Kirchhoff's Laws (KCL and KVL).

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Electronics-I	**Course Code:**	UMJPYT301
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Practicals :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Unit-III

Fundamentals of Semiconductors:

Energy levels of electrons in isolated atom, concept of energy bands in insulators, metals and semiconductors, electrical properties of semiconductors, intrinsic and extrinsic semiconductors, direct and indirect band gap semiconductors, qualitative idea of Fermi level, forbidden energy gap, free electron and holes, Energy band diagram in case of extrinsic semiconductors, mass action law, intrinsic carrier densities, Transport phenomenon in semiconductors, mobility and conductivity. Drift and diffusion currents

Unit-IV

Semiconductor pn-junction:

Junction diode – PN Junction (unbiased and biased). Formation of depletion layer in forward and reverse biased diode, Diode current equation, temperature effect on V-I characteristics of PN Junction. Application of diode as a switch, Rectifier, Types of rectifier and its applications (HWR and FWR). Ripple factor and efficiency of Rectifiers, avalanche and zener breakdown.

Special diodes: Zener diode, V-I characteristics and its application as voltage regulator, construction and working of: LED, LASER diode, Photodiode, Solar cell.

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Electronics-I	**Course Code:**	UMJPYT301
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term 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 Semester 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 FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Electronics-I	**Course Code:**	UMJPYT301
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Practicals :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Text and Reference Books

1. S.M Sze, Semiconductor devices: Physics and technology, 2nd edition , Wiley India edition (2002)
2. Jasprit Singh, Semiconductor devices: Basic principles, John Wiley and Son (2001)
3. Basic Electronics by Albert Malvino David Bates and A.B Patil
4. S.A Nasar, Electric Circuits , Schaum's outline series Tata MacGraw Hill(2004)
5. S.N Ali, Basic Electronics, 2nd edition
6. B.G. Streetman, S.K. Banerjee, "Solid state Electronic Devices", Pearson Education India, 2015,7thed.
7. J.D. Ryder, "Electronic Fundamentals and Applications", Prentice-Hall 0f India Pvt. Ltd, 1975, 5thed.

Syllabus for Practicals (C.No.UMJPYT301)

Note: Perform any 05 of the following experiments as per availability of the apparatus

List of experiments:

1. Study of V-I characteristics of pn junction diode.
2. Study of V-I characteristics of zener diode.
3. Study of Ripple factor of HWR and FWR with and without filters.
4. Study of transistor characteristics in CB configuration.
5. Study of transistor characteristics in CE configuration.
6. Study of zener diode as voltage regulator.
7. Verification of Thevenin's theorem and Maximum Power Transfer Theorem.
8. Verification of superposition theorem.

Pattern of Exam for Practicals: ContinuousAssessment:10 marks

Final Examination (To be conducted by the course Coordinator internally):15 marks

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Heat and Thermodynamics	**Course Code:**	UMJPYT302
Credits:	4	**L T P:**	3-1-0
Contact Hours	45 (Theory) + 15 (Tutorial)		
Duration of Exam	3 Hours (Theory) 1 Hour (Tutorials)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Tutorials :** **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:

After completing this course content, student will be able to understand:

- Basic concepts of Thermodynamics
- Basic concepts of Entropy
- Basic concepts of Heat Transfer Mechanisms
- Basic concepts of Temperature Scales

Unit-I

Concepts of Thermodynamics : Thermodynamic state of a system and zeroth law of thermodynamics, thermodynamic equilibrium, adiabatic and isothermal changes, work done during isothermal changes, adiabatic relations for perfect gas, work done during adiabatic change, indicator diagram, first law of thermodynamics, reversible and irreversible processes.

Unit-II

Second law of thermodynamics: Kelvin-Planck and Clausius statements and their equivalence, Carnot's theorem, thermodynamic scale of temperature and its identity with gas scale.
Entropy: Additive nature of entropy, Entropy changes in reversible and irreversible processes, Heat death of the universe, Impossibility of attaining absolute zero, Nernst heat theorem and Third law of thermodynamics. Temperature-entropy diagram,

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Heat and Thermodynamics	**Course Code:**	UMJPYT302
Credits:	4	**L T P:**	3-1-0
Contact Hours	45 (Theory) + 15 (Tutorial)		
Duration of Exam	3 Hours (Theory) 1 Hour (Tutorials)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Tutorials :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Unit-III

Heat Transfer Mechanisms: Heat Engines (Carnot's cycle and Carnot's heat engine and its efficiency, Otto cycle and its efficiency, Diesel cycle and its efficiency), Refrigerators (General principle and coefficient of performance of refrigerator, The Carnot refrigerator, Simple structure of vapour compression refrigerator), Air conditioning: principle and its applications.

Unit-IV

Maxwell's thermodynamic relations: Intensive and extensive parameters, Thermodynamic potentials- Internal energy, Enthalpy, Helmholtz free energy and Gibb's free energy. Maxwell's thermodynamic relations. T-dS equations, Cooling due to Adiabatic Expansion of gas. Clausius-Clapeyron latent heat equations. Joule-Thomson effect and its mathematical treatment. Cooling due to adiabatic demagnetization and production of very low temperature by it.

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.

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Heat and Thermodynamics	**Course Code:**	UMJPYT302
Credits:	4	**L T P:**	3-1-0
Contact Hours	45 (Theory) + 15 (Tutorial)		
Duration of Exam	3 Hours (Theory) 1 Hour (Tutorials)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Tutorials :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Note for paper setters for Mid Semester Examination:

The Mid Semester 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. A Treatise on Heat, M.N. Saha, and B.N. Srivastava, 1973, Indian Press.
2. Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
3. Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill
4. Theory and experiment on Thermal Physics, P.K.Chakrabarti, New central Book Agency.
5. Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. Chand and Co, New Delhi.
6. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Major
Course Name:	Heat and Thermodynamics	**Course Code:**	UMJPYT302
Credits:	4	**L T P:**	3-1-0
Contact Hours	45 (Theory) + 15 (Tutorial)		
Duration of Exam	3 Hours (Theory) 1 Hour (Tutorials)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Tutorials :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Syllabus for Tutorials (C.No.UMJPYT302)

Equation of state: Equations of state, Andrew's experiment, Amagat's experiment, Vander Waal's equation of state, critical constants, reduced equation of state, Joule-Thomson porous plug experiment. Temperature of Inversion, Critical Temperature and Boyle's Temperature

Thermometry: Temperature scales (Centigrade, Fahrenheit and Kelvin scale), principle, construction and working of following thermometers:
Liquid and gas thermometers, Resistive type thermometers, Thermocouple as thermometer, Pyrometers.

Pattern of Exam for Tutorials: ContinuousAssessment:10 marks
Final Examination (To be conducted by the course coordinator internally):15marks

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Minor
Course Name:	Basic Electronics	**Course Code:**	UMIPYT303
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term 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:

After completing this course content, student will be able to understand:

- Introduction to basic electronic components and circuits.
- Semiconductors and its application

Unit-I

Basic concepts and components: Concepts of electrical signal: analog, digital and their graphical and mathematical representation; signal sources: independent sources (voltage and current sources), dependent sources; discrete and integrated circuits active and passive devices.

Circuit components: Resistors, Inductors and Capacitors (purpose in the electrical circuit, materials, equivalent circuit), potentiometers.

Unit-II

Networks and theorems: DC and AC Circuit analysis of RC, RL circuits and RLC series and resonant circuits.(DC Transient analysis: RC Circuit- charging and discharging with initial charge, RL circuit with initial charge, Time constant, DC response of series RLC circuits; AC circuit analysis: LCR circuits- series, condition of resonance, resonant frequency, bandwidth and Q-factor).

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Minor
Course Name:	Basic Electronics	**Course Code:**	UMIPYT303
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Practicals :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Unit-III

Semiconductor Physics: Fundamentals

Energy levels of electrons in isolated atom, concept of: energy bands in insulators, metals and semiconductors, electrical properties of semiconductors, intrinsic and extrinsic semiconductors, direct and indirect band gap semiconductors, Fermi level, forbidden energy gap, free electron and holes, Energy band diagram in case of extrinsic semiconductors, mass action law, Junction diode – PN Junction (unbiased and biased). Diode current equation, p n junction diode as half wave and full wave rectifier.

Unit-IV

Semiconductor devices

Junction diode – avalanche and Zener breakdown, Zener diode, V-I characteristics and its application as voltage regulator, Special diodes: construction and working of: LED, LASER diode, Photodiode, Solar cell.

Bipolar junction diode: pnp and npn transistor, basic transistor action, transistor amplifier configurations (CB, CE, CC) output characteristics and their comparison, DC load line and Q-point.

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Minor
Course Name:	Basic Electronics	**Course Code:**	UMIPYT303
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term 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 Semester 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 FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Minor
Course Name:	Basic Electronics	**Course Code:**	UMIPYT303
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Practicals :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Text and Reference Books

1. S.M Sze, Semiconductor devices: Physics and technology, 2nd edition, Wiley India edition (2002).
2. Jasprit Singh, Semiconductor devices: Basic principles, John Wiley and Son (2001).
3. Basic Electronics by Albert Malvino David Bates and A.B Patil.
4. S.A. Nasar, Electric Circuits, Schaum's outline series Tata MacGraw Hill(2004).
5. S.N Ali, Basic Electronics, 2nd edition.
6. B.G. Streetman, S.K. Banerjee, "Solid state Electronic Devices", Pearson Education India, 2015, 7thed.
7. J.D. Ryder, "Electronic Fundamentals and Applications", Prentice-Hall 0f India Pvt. Ltd, 1975, 5thed.

Syllabus for Practicals (C.No.UMJPYT303)

Note: Perform any 05 of the following experiments as per availability of the apparatus

List of experiments:

1. Study of V-I characteristics of pn junction diode.
2. Study of V-I characteristics ofzener diode.
3. Study of Ripple factor of HWR and FWR with and without filters.
4. Study of transistor characteristics in CB configuration.
5. Study of transistor characteristics in CE configuration.
6. Study of Zener diode as voltage regulator.
7. Verification of Thevenin's theorem and Maximum Power Transfer Theorem.
8. Verification of superposition theorem

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Minor
Course Name:	Basic Electronics	**Course Code:**	UMIPYT303
Credits:	4	**L T P:**	3-0-1
Contact Hours	45 (Theory) + 30 (Practicals)		
Duration of Exam	3 Hours (Theory) 2 ½ Hours (Practicals)		
For Theory : **End Semester Exam : 60 Marks** **Mid Term Exam: 15 Marks**		**For Practicals :** **Final Exam : 15 Marks** **Continuous Assessment: 10 Marks**	

Pattern of Exam for Practicals: Continuous Assessment: 10 marks
Final Examination (To be conducted by the course coordinator internally) :15 marks

Suggested Books

1. B.Sc. Practical Physics by C.L Arora
2. Practical Physics by R.K Shukla
3. B.Sc. Practical Physics by Harnam Singh

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

B.Sc.- Physics			
Semester:	III	**Type:**	Multi-disciplinary
Course Name:	Physics in Daily Life-III	**Course Code:**	UMDPYT306
Credits:	3	**L T P:**	3-0-0
Contact Hours	45 (Theory)		
Duration of Exam	3 Hours		
For Theory : End Semester Exam : 60 Marks; Mid Term Exam: 15 Marks			

Course Outcomes:

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

Unit-I

Physics of Measurement: Physical quantities, Units and standards in Physics, International System of Units, Standards of Time, Length and Mass, Precision and Significant Figures, Errors in measurement (types, sources and minimizing techniques). Overview of Electronic measurement devices (voltmeter, ammeter and multimeter).

Unit-II

Everyday Physics from Circuits to Electric Generators: Basics of electricity (Ohm's law in macroscopic form and microscopic) Magnetic Force and Magnetism (types and magnetic materials), Lorentz Force, Electric Generator (principle, components and block diagram) and Transformer (working principle, types and components).

Unit-III

Impacts of Nuclear Physics on Daily Life: Atomic Nucleus, Structure and behaviour, Binding Energy and Nuclear Stability, Radioactivity, Laws of Radioactive Decay, Reaction mechanism in controlled and uncontrolled nuclear chain reactions, Nuclear Fission and Nuclear Fusion, Nuclear Power Plants (components, working and advantages).

Unit IV

Space Science in Daily Life: Planets and Gravitational Force, Kepler's Laws of Planetary Motion (Qualitative idea only), Geosynchronous Satellite, Description of Satellites for communication through block diagram (mobile phone networks and internet access), Outline of Global Positioning System (GPS), Satellites for weather forecasting (introduction of key features and orbits).

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Syllabus of Physics at FYUP under CBCS as per NEP-2020
for the examination to be held in December 2025, 2026 and 2027

Semester :	III	**Type:**	Multi-disciplinary
Course Name:	Physics in Daily Life-III	**Course Code:**	UMDPYT306
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. "Introduction to Measurements and Instrumentation" (PHI Publications) by Arun K. Ghosh.
2. "Fundamentals of Physics" (Part 1, Wiley Publications) by Halliday, Resnick, and Walker.
3. "Physics for Scientists and Engineers" (Volume 1, Cengage Learning Publications) by Raymond A. Serway and John W. Jewett.
4. "A text Book of Electrical Technology" (S. Chand Pub.) by B.L. Theraja and A.K. Theraja.
5. "Atomic and Nuclear Physics" (S.Chand & Company) by N. Subrahmanyam and Brij Lal.
6. "Nuclear Physics: Principles and Applications" (Wiley Publications) by John Lilley.
7. "Structure of the Universe" (Oxford University Press) by Jayant Vishnu Narlikar.
8. "Fundamentals of Remote Sensing and GIS" (Universities Press) by George Joseph.
9. "Satellite Technology: Principles and Applications" (Wiley Publications) by Anil K. Maini and Varsha Agrawal.

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 FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

Semester :	III	**Type:**	Skill Enhancement Course
Course Name:	Photography and video-audiography	**Course Code:**	USEPYT311
Credits:	3	**L T P:**	1-0-2
Contact Hrs.	Theory-15 hours Practical - 60 hours	**Duration of Exam**	Theory- 1½ Hour Practical - 3 Hours
For Theory : **Mid Semester Exam : 25 Marks**		**For Practicals :** **Final Exam : 50 Marks**	

Course learning outcomes:

- After completing this course content, student will be able to understand:
- basics of still photography
- basics of camera handling, technicalities of cameras, lenses
- fundamentals of Audio video recording
- How to do recoding of audio and video on Compact Discs, etc.

Unit-I

Photography – Camera

Camera – an introduction, part of a camera, camera eye (lens), shutters, special lens. Types of camera – their basic principle, constructions and working. Principle of video camera, choosing a camera, picture size. Choice of lens – angle of view and resolving power, aperture and focusing. aperture and speed relationship, use of exposure meter.

Unit-II

Audio – Video Recording

Basics of sound (frequency, amplitude, pitch, decibel level), Basic principle of recording (Inter-conversion), Methods of conversion of video signal into electrical signals, Methods of conversion of audio signal into electrical signals, Audio file formats (Uncompressed, lossless and lossy compressions), and video file formats, Concept of container formats and codecs, choice of video formats (MP4, AVI, MOV – based on quality, file size, compatibility, versatility and streaming).

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SYLLABUS OF PHYSICS FOR 3RD SEMESTER OF FYUP UNDER CBCS AS PER NEP-2020 FOR THE EXAMINATION TO BE HELD IN DECEMBER 2026, 2027 and 2028

Semester :	III	**Type:**	Skill Enhancement Course
Course Name:	Photography and video-audiography	**Course Code:**	USEPYT311
Credits:	3	**L T P:**	1-0-2
Contact Hrs.	Theory-15 hours Practical - 60 hours	**Duration of Exam**	Theory- 1½ Hour Practical - 3 Hours
For Theory : **Mid Semester Exam : 25 Marks**		**For Practicals :** **Final Exam : 50 Marks**	

Unit-III

Audio- video storage:

Optical Discs and types, Compact disc – limitation of traditional audio recording system, lamination video recording system, need for compact disc, advantages of compact disc, CD for audio recording, Basic principle of audio recording, Care and cautions, CD for video –recording, Basic principle for video recording, CD – players, operating principle. USB drive and SD cards for audio video recording.

NOTE FOR PAPER SETTING

***Note for paper setters for End Semester Examination*: Part -1**

The question paper will be of 25 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 at least one question from each unit. The students have to attempt all the questions from Section A.

Section B shall comprise of a total of **6** questions with two questions from each unit. Each question shall be of **05** marks. The students have to attempt **3** questions by selecting only one question from each unit.

EVALUATION OF SKILLS: *Final Examination Part-2*

The evaluation off skills will be internal. The examination of skills shall be of 50 marks. The evaluation of skills will be done internally through the board of 03 members (including the trainer of the course).

Text and Reference Books:

1. Photography: Physics and Art in Focus by John Beaver.
2. The Science and Practice of Photography by John R. Roebuck.
3. Physics of Sound by Richard E. Berg, Pearson India.
4. The Physics of Optical Recording by Kurt Schwartz