KURUKSHETRA UNIVERSITY KURUKSHETRA

(Established by the State Legislature Act XII of 1956)
("A+" Grade NAAC Accredited)

Scheme of Examination and Syllabus for

Undergraduate Programme

Subject: PHYSICS

Under Multiple Entry-Exit, Internships and

CBCS-LOCF in accordance to NEP 2020

w.e.f. 2023-24 (in phased manner)

Kurukshetra University Kurukshetra
Undergraduate Programs
Course: MDC-1

Session: 2023-24			
Part A - Introduction			
Subject	Physics		
Semester	1st		
Name of the Course	Physics Fundamentals –I		
Course Code	B23-PHY-104		
Course Type: (CC/MCC/MDC/CC-M/ DSEC /VOC/DSE/PC/AEC/VAC)	MDC		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	Not studied Physics subject at level 4 (i.e. 10+2 or equivalent)		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Have knowledge about the nature, scope and impact of physics on technological development of the society. 2. Understand and describe motion of an object in one dimension. 3. Understand and describe the laws of motion and their applications in daily life. 4. Understand and appreciate the importance of work, power and energy in daily life. 5. Learn to present observations, results, analysis and different concepts related to experiments of Physics Fundamentals –I		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75 **Internal Assessment Marks:20** **End Term Exam Marks: 55**	**Time:3hrs**		
Part B- Contents of the Course			

1. Nine questions will be set in total.
2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.
3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Physics - Nature, scope and excitement, major discoveries in Physics, major contribution by Indian Physicists, Physics in relation to other sciences, impact of physics on society and on latest development in science and technology. Units and Dimensions – Physical quantities – fundamental (mass, length and time) and derived. Need of measurement, fundamental and derived units, measuring process.	8
II	Scalar and Vector quantities with definition, representation and examples, unit vectors, position vector, co-initial vector, collinear vector and co-planar vector. Scalar and vector product (no derivation). Motion of objects in one, two and three dimensions with examples, concept of position, distance, displacement, speed, velocity, average and instantaneous speed, average and instantaneous velocity and acceleration, uniform and non-uniform motion.	7
III	Causes of motion- concept of force, Newton's laws of motion, daily life applications of Newton's laws of motion, inertia, linear momentum and their significance. Force of friction with daily life examples, Impulse with examples. Circular and rotational motion with examples. Idea of angular displacement, angular velocity, angular acceleration, frequency, time-period, torque, angular momentum, moment of inertia and is physical significance.	8
IV	Work, Power and Energy – Work - definition, symbol, formula, units and type of work (zero, positive, negative) with examples. Energy - definition, symbol, formula, units, examples, types of mechanical energy, kinetic energy - definition, symbol and formula, potential energy - definition, symbol and formula, daily life examples demonstrating importance of energy, potential energy of an object at a height. Power – definition, formula and units, daily life examples.	7
	Practicum 1. To measure the diameter of a small spherical / cylindrical body. 2. To measure the length, width and height of the given rectangular block. 3. To measure the internal diameter and depth of a given beaker/calorimeter and hence find its volume. 4. Use of screw gauge:(i) to measure diameter of a given wire and (ii) to	30

	measure thickness of a given sheet	
	5. To determine radius of curvature of a given spherical surface by a spherometer.	
	6. To find the weight of a given body using parallelogram law of vectors.	
	7. Verification of Archimedes principle.	
	8. Verification of Work-energy theorem.	
	9. Acceleration due to gravity (g) by bar pendulum.	
	10. To determine the moment of Inertia of a fly-wheel.	
	11. Study of law of conservation of linear momentum and Kinetic Energy.	
	Note: Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination.	

Suggested Evaluation Methods

Internal Assessment:	End Term Examination : 35 Marks
➢ **Theory (15 Marks)**	
• Class Participation: **04 Marks**	
• Seminar/presentation/assignment/quiz/class test etc.: **04 Marks**	
• Mid-Term Exam: **7 Marks**	
➢ **Practicum (5 Marks)**	: 20 Marks
• Class Participation: **Nil**	
• Seminar/Demonstration/Viva-voce/Lab records etc.: **5 Marks**	
• Mid-Term Exam: **Nil**	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Essential University Physics, Vol.-1 &2 by Richard Wolfson, Pearson Education, Patparganj, Delhi, India.
2. Concept of Physics by H.C. Verma, Bharti Bhawan, Ansari Road, Daryaganj, New Delhi, India.
3. Modern Physics (2nd edition), by S.L. Kakani and Shubhra Kakani, Viva Books, New Delhi.
4. Physics for Scientists and Engineers with Modern Physics, 7th edition, by Raymond A. Serway and John W. Jewett, Jr., Thomson Higher Education 10 Davis Drive Belmont, CA 94002-3098 USA.
5. Physics For You, Fifth Edition, by Keith Johnson, OUP Oxford; 5th edition (23 June 2016).
6. B.Sc Practical Physics, C. L. Arora, R Chand & Co. New Delhi
7. B.Sc Practical Physics, Harnam Singh and Dr. P.S. Hemne, S Chand & Company Ltd.

Kurukshetra University Kurukshetra
Undergraduate Programs
Course: MDC-2

Session: 2023-24	
Part A - Introduction	
Subject	Physics
Semester	2nd
Name of the Course	**Physics Fundamentals-II**
Course Code	B23-PHY-204
Course Type: (CC/MCC/MDC/CC-M/ DSEC /VOC/DSE/PC/AEC/VAC)	MDC
Level of the course (As per Annexure-I	100-199
Pre-requisite for the course (if any)	Not studied Physics subject at level 4 (i.e. 10+2 or equivalent)
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Have basic knowledge about Wave motion, SHM, the associated phenomena and their applications in daily life 2. Have basic knowledge about nature of light, the associated phenomena and their importance in daily life 3. Have basic knowledge about electric current, electric circuit, electric components, and practical utility of heating and magnetic effects of electric current 4. Grasp an introductory idea about the Electric components and circuits 5. Understand the observations, results, analysis and different concepts related to experiments of light & optics.

Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4

Max. Marks:75 **Internal Assessment Marks:20** **End Term Exam Marks: 55**	**Time:3hrs**

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in total.

2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.

3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Wave motion and applications – Waves - definition, types (mechanical and electromagnetic wave), Wave motion - transverse and longitudinal with examples, terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length. Simple harmonic motion (SHM): definition, examples, free, forced and resonant vibrations with examples.	8
II	Light and ray optics – Definition, nature, speed and properties of light, reflection and refraction of light, laws of reflection and refraction, examples and applications in daily life, reflection through mirrors (plane, convex and concave) and refraction through lenses (concave and convex), refractive index, refraction of light through prism (dispersion of light), rainbow formation, twinkling of stars, advance sunrise and delayed sunset.	7
III	Electricity - electric charge, types of charges, unit of charge, frictional electricity, Coulomb's law of electrostatics, electric field, electric lines of force, electric field intensity (definition and properties), electric flux, Gauss's law (statement and formula only), electric current, units of electric current, direct and alternating current, measurement of current, resistance, resistivity and Ohm's law, electric potential, potential difference and emf.	8
IV	Electric components and circuits - resistor, capacitor, electric cell, ammeter, voltmeter, galvanometer, keys and variable resistors. Series and parallel combinations of resistors, domestic electrical wiring and electrical safety (fuse, hot wire, neutral, ground and short circuit), electric power and electric power transmission; Heating effect of current and its practical applications.	7
	Practicum 1. To find the focal length of a convex mirror using a convex lens. 2. To find the value of v for different values of u in the case of a concave mirror and to find the focal length 3. To find the focal length of a concave lens using a convex lens. 4. To determine the refractive index of a glass slab 5. To find the refractive index of a liquid using a convex lens and plane	30

	mirror
	6. To determine the resistivity of different wires by plotting a graph for potential difference versus current.
	7. To verify Ohm's law for metallic conductor and to determine its resistance.
	8. To find the frequency of AC mains with a sonometer.
	9. Use of Multimeter for measuring Resistance, A.C. and D.C. Voltage and Current, checking of electrical fuses.
	10. Use of Multimeter to check the working condition of diode, an LED, a resistor and a capacitor.
	Note: Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination.

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory (15 Marks)** • Class Participation: **04 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **04 Marks** • Mid-Term Exam: **7 Marks** ➢ **Practicum (05 Marks)** • Class Participation: **Nil** • Seminar/Demonstration/Viva-voce/Lab records etc.: **05 Marks** • Mid-Term Exam: **Nil**	**End Term Examination : 35 Marks** **20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Essential University Physics, Vol.-1 &2 by Richard Wolfson, Pearson Education, Patparganj, Delhi, India.
2. Concept of Physics by H.C. Verma, Bharti Bhawan, Ansari Road, Daryaganj, New Delhi, India.
3. Modern Physics (2nd edition), by S.L. Kakani and Shubhra Kakani, Viva Books, New Delhi.
4. Physics for Scientists and Engineers with Modern Physics, 7th edition, by Raymond A. Serway and John W. Jewett, Jr., Thomson Higher Education 10 Davis Drive Belmont, CA 94002-3098 USA.
5. Physics For You (Fifth Edition) by Keith Johnson.
6. B.Sc Practical Physics, C. L. Arora, R Chand & Co. New Delhi
7. B.Sc Practical Physics, Harnam Singh and Dr. P.S. Hemne, S Chand & Company Ltd.

Kurukshetra University Kurukshetra
Undergraduate Programs
Course: MDC-3

Session: 2023-24	
Part A - Introduction	
Subject	Physics
Semester	3rd
Name of the Course	**Elements of modern Physics**
Course Code	B23-PHY-304
Course Type: (CC/MCC/MDC/CC-M/ DSEC /VOC/DSE/PC/AEC/VAC)	MDC
Level of the course (As per Annexure-I	100-199
Pre-requisite for the course (if any)	Not studied Physics subject at level 4 (i.e. 10+2 or equivalent)
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Have introductory idea about the importance of semiconductors and basic semiconductor devices 2. Have the knowledge about the importance of magnetic materials 3. Understand importance of radioisotopes, Nuclear fission and fusion reactions and their hazardous aspects also 4. Have the knowledge about the lasers and optical fibers and their importance in scientific and technological fields _____ 5. Learn to present observations, results, analysis and different concepts related to experiments of Elements of modern Physics.

Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4

Max. Marks:75 **Internal Assessment Marks:20** **End Term Exam Marks: 55**	**Time:3hrs**
Part B- Contents of the Course	

Instructions for Paper- Setter

1. Nine questions will be set in total.

2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.

3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Basics of semiconductors - atomic structure, energy levels and energy bands (basic idea), types of materials (conductors, semiconductors and insulators) their energy band diagrams and definition on the basis of energy gap, intrinsic semiconductors, extrinsic semiconductors -p-type and n-type semiconductors (basic idea), Basics of Semiconductor devices - P-N junction diode - depletion layer, forward biasing and reverse biasing, V-I characteristics of PN junction diodes; ideal diode, diode as a switch, Basic idea of a Photodiode, Solar cell and Light emitting diode (LED).	8
II	Magnetic Materials - Introduction, classification – paramagnetic, diamagnetic and ferromagnetic materials and their applications; Piezoelectricity and applications of Piezoelectric materials; Ceramics and polymers and their applications; Superconductivity, superconductors and their applications; Nanomaterials and their applications.	7
III	Atomic nucleus – Idea of composition and properties of nucleus (charge, mass, size and density), nucleons, atomic number, mass number, isotopes, isobars and isotones; nuclear binding energy, Radioactive decay - α, β, and γ-decay; Idea of half-life time and decay constant, carbon dating and its importance, radioisotopes and their applications. Idea of nuclear fission and nuclear fusion. Nuclear reactors, source of solar and stellar energy.	7
IV	Laser – introduction, absorption, spontaneous emission, stimulated emission, properties of laser light. Principle of laser - Light amplification, population inversion and pumping. Principle and working of Ruby, He-Ne and semiconductor laser (basic idea). Applications of Lasers in healthcare and different fields of science and technology. Basics of Fiber Optics- introduction to optical fibers (definition, principle and parts) light propagation and the optical fibers, types of optical fiber (basic idea), applications of optical fibers in medical, telecommunication and sensors.	8

	Practicum
	    1. V-I characteristics of p-n junction diode.
	    2. V-I characteristics of Zener diode.
	    3. Characteristics of Solar Cell
	    4. To verify the inverse square law of light using a photo-voltaic cell.
	    5. To determine value of Boltzmann constant using V-I characteristic of PN diode.
	    6. To study the effect of intensity of light (by varying distance of the
		30

source) on an LDR
7. To verify the characteristics of LASER
8. To measure the numerical aperture of an optical fibre using He-Ne laser source.
9. Study double slit interference by He-Ne laser
10. Determine the diameter of a wire using (He-Ne Laser) diffraction method

Note: Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination.

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory (15 Marks)** • Class Participation: **04 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **04 Marks** • Mid-Term Exam: **7 Marks** ➢ **Practicum (5 Marks)** • Class Participation: **Nil** • Seminar/Demonstration/Viva-voce/Lab records etc.: **5 Marks** • Mid-Term Exam: **Nil**	**End Term Examination : 35 Marks** **: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Concept of Modern Physics by Arthur Beiser, McGraw Hill Education.
2. Modern Physics (2nd edition), by S.L. Kakani and Shubhra Kakani, Viva Books, New Delhi.
3. Semiconductor Devices - Physics and Technology by S.M .Sze ,Wiley (1985)
4. Laser and Non-linear optics by B.B.Laud. ,Wiley Eastern Limited (1985)
5. Semiconductor Electronics by A.K.Sharma ,New Age International Publisher(1996)
6. Kenneth S. Krane, Introductory Nuclear Physics, Wiley, New York, 1988
7. Radiation detection and measurement: G.F. Knoll (Wiley, New York) (2000)
8. Verma and Srivastava : Crystallography for Solid State Physics
9. Rajnikant; Solid State Physics, Willey India, 2011.
10. J.C. Anderson, KD. Leaver, R.D. Rawlings and J.M. Alexander, Materials Science, 4th Edition (ChapmanHall, London, 1990).
11. V. Raghavan, Materials Science and Engineering, 3rd Ed. (Prentice-Hall India, New Delhi, 1993).
12. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
13. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn 4 Edition, reprinted 1985, Heinemann Educational Publishers
14. B.Sc Practical Physics, C. L. Arora, R Chand & Co. New Delhi
15. B.Sc Practical Physics, Harnam Singh and Dr. P.S. Hemne, S Chand & Company Ltd.