U17PHT1001	Physics for Aeronautical Engineering	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Various engineering subjects and applications

CO2: Crystal structure identification of engineering materials

CO3: Application of lasers and optical fibers in engineering and technology

CO4: Perceive the basics of quantum and its applications

CO5: Understand the concepts of ultrasonics and Non-destructive techniques.

CO6: Perceive the basics of electromagnetism for various engineering applications

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Assignment; Journal paper review, Group Presentation, Project report, End Semester Examination
Indirect
1. Course-end survey

CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of interplanar distances – atomic radius – co- ordination number – packing factor for SC, BCC, FCC and HCP structures. Crystal imperfections: point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

APPLIED OPTICS **9 Hours**

Air wedge and its applications - Lasers – spontaneous and stimulated emissions – Einstein's coefficients – Types of LASER – Nd : YAG, CO_2 and semiconductor laser – Homo junction (qualitative description) – applications –Holography (Qualitative only) – optical fiber – principle and propagation of light in optical fibers – numerical aperture and acceptance angle –types of optical fibers – light sources and detectors – communication system.

QUANTUM PHYSICS **9 Hours**

Introduction - Planck's quantum theory of black body radiation (derivation) – photo electric effect(Qualitative only) – Compton effect (derivation) and experimental verification of Compton effect – De-Broglie's concept - Schrodinger wave equation – time independent and time dependent equations (derivations) – physical significance of wave function – particle in

a box (one dimensional case) – electron microscope – scanning electron microscope – transmission electron microscope.

ULTRASONICS AND NDT **9 Hours**

Ultrasonics: Production of ultrasonics - magnetostriction oscillator - piezo electric method –properties –detection – acoustic grating – applications - SONAR.

NDT: Liquid penetrant method – ultrasonic flaw detector: A scan, B scan and C scan – X-ray radiography and fluoroscopy – thermography.

ELECTROMAGNETISM **9 Hours**

Magnetic effects of electric current - magnetic fields - definition of fundamental terms. permeability - forces due to currents - uniform and non-uniform magnetic fields - static and time-varying magnetic fields - electromagnetic induction - expression for induced emf - Gauss theorem - electromagnetic waves - propagation of electromagnetic waves through isotropic media - Maxwell's equations and interpretation of Maxwell's equations

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
2. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
3. Richard Wolfson, ―Essential University Physics, Vols. 1 and 2. Pearson Education, Singapore, 2011.
4. Crawford Jr Waves, F.S. – Berkeley Physics Course, Vol. 3, 2008.
5. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
6. Johnson R. A., “Miller & Freund’s Probability and Statistics for Engineers”, Sixth Edition, Pearson Education, Delhi, 2000.
7. Gupta S.C, and Kapur, J.N., “Fundamentals of Mathematical Statistics”, Sultan Chand, Ninth Edition, New Delhi, 1996
8. Walpole R. E., Myers S.L. & Keying Ye, “Probability and Statistics for Engineers and Scientists”, Pearson Education Inc, 2002
9. Purcell, E.M, ―Electricity and Magnetism – Berkeley Physics Course, Vol. 2, Tata McCraw-Hill ,2007. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
10. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.

U17PHT1002 Physics for Automobile Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Various engineering subjects and applications.

CO2: Crystal structure identification of engineering materials

CO3: Application of lasers and optical fibers in engineering and technology

CO4: Perceive the basics of quantum and its applications

CO5: Understand the concepts of production and detection of ultrasonic waves for various applications.

CO6: Acquire the knowledge of various materials testing procedures.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
3. Continuous Assessment Test I, II 4. Assignment; Journal paper review, Group Presentation, Project report, End Semester Examination
Indirect
1. Course-end survey

CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of interplanar distances – atomic radius – co- ordination number – packing factor for SC, BCC, FCC and HCP structures- crystal imperfections: point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

APPLIED OPTICS **9 Hours**

Air wedge and its applications - Lasers – spontaneous and stimulated emissions – Einstein's coefficients – Types of LASER – Nd : YAG, CO_2 and semiconductor laser – Homo junction (qualitative description) – applications –Holography (Qualitative only) – optical fiber – principle and propagation of light in optical fibers – numerical aperture and acceptance angle –types of optical fibers – light sources and detectors – communication system.

QUANTUM PHYSICS **9 Hours**

Introduction - Planck's quantum theory of black body radiation (derivation) – photo electric effect(Qualitative only) – Compton effect (derivation) and experimental verification of Compton effect – De-Broglie's concept - Schrodinger wave equation – time independent and time dependent equations (derivations) – physical significance of wave function – particle in

a box (one dimensional case) – electron microscope – scanning electron microscope – transmission electron microscope.

ULTRASONICS **6 Hours**

Ultrasonics: Production of ultrasonics: magnetostriction oscillator - piezo electric method – properties –detection – acoustic grating – application of Ultrasonic's in automotive industries

MATERIALS TESTING **12 Hours**

Destructive: Mechanism of plastic deformation, slip and twinning – types of fracture – testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell) Impact test Izod and charpy, fatigue and creep test. Non Destructive: Liquid Penetrant method – ultrasonic flaw detector: A scan, B scan, C scans – X- ray radiography and fluoroscopy – thermography.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

11. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
12. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
13. Richard Wolfson, ―Essential University Physics, Vols. 1 and 2. Pearson Education, Singapore, 2011.
14. Crawford Jr Waves, F.S. – Berkeley Physics Course, Vol. 3, 2008.
15. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
16. Sydney H.Avner "Introduction to Physical Metallurgy" McGraw-Hill Book Company, 1994.
17. Purcell, E.M, ―Electricity and Magnetism – Berkeley Physics Course, Vol. 2, Tata McCraw-Hill ,2007. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
18. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.

U17PHT1003 **Physics for Biotechnology**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze and identify the crystal structure in materials.

CO2: Understand the imperfections in a crystal system.

CO3: Illustrate the types of lasers, optical fibers and its application to engineering.

CO4: Perceive the basics of quantum for its various applications.

CO5: Understand the production of ultrasonics.

CO6: Acquire the knowledge of medical instrumentation.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
5. Continuous Assessment Test I, II 6. Group Presentation, Project report, Poster preparation, End Semester Examination
Indirect
1. Course-end survey

CRYSTALLOGRAPHY **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of interplanar distances – atomic radius – coordination number – packing factor for SC, BCC, FCC and HCP structures – crystal imperfections – point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

LASER SYSTEMS AND FIBER OPTICS **9 Hours**

Air wedge and its applications - lasers – spontaneous and stimulated emissions – Einstein's coefficients – Nd : YAG, CO_2 and semiconductor laser – homo junction (qualitative only) - principle and propagation of light in optical fibers – numerical aperture and acceptance angle – types of optical fibers – applications – fiber optic communication system – medical endoscopy.

QUANTUM PHYSICS **9 Hours**

Planck's quantum theory of black body radiation (derivation) – photo electric effect(Qualitative only) – Compton effect (derivation) and experimental verification of Compton effect – De Broglie's concept - Schrodinger wave equation – time independent and time dependent equations (derivations) – physical significance of wave function – particle in a box (one dimensional case) – Electron microscope – Scanning electron microscope – Transmission electron microscope.

ULTRASONICS **9 Hours**

Introduction – production methods of ultrasonics – magnetostriction generator – piezo electric generator – properties – detection – cavitation effect –acoustical grating – velocity measurement – applications: SONAR –velocity of blood flow – ultrasonic flaw detector – A scan, B scan, C scan-Non destructive testing-X ray radiography & X-ray fluoroscopy-thermography- IR camera-optical non destructive testing.

MEDICAL INSTRUMENTATION **9 Hours**

Phonocardiograph (PCG) -sources of radioactivity for nuclear medicine-Geiger Muller counter-photo multiplier tube & scintillation detector (Renogram) and its clinical applications (thyroid and kidney function) – nuclear medicine- imaging devices - gamma camera - positron camera.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

19. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
20. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
21. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd, New Delhi,2005.
22. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
23. Palinisamy P.K., Engineering Physics I, Scitech Publications, Chennai, 2011.
24. Alan Holden and Phylis Morrison, Crystals and Crystal Growing, MIT press, 1982.

U17PHT1004 Physics for Civil Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: To identify, formulate and to solve the engineering problems.

CO2: To determine a particular crystal structure, the crystallographic directions and planes, the linear and planar atomic densities.

CO3: Perceive the basics of quantum mechanics.

CO4: Describe the impact of acoustic engineering solutions in a constructional, environmental, and societal context.

CO5: To acquire knowledge of fundamentals of new engineering materials and nano materials.

CO6: Understand the concepts of nuclear models and reactor mechanisms.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct

7. Continuous Assessment Test I, II
8. Group Presentation, Project report, Poster preparation, End Semester Examination

Indirect

1. Course-end survey

CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of inter-planar distances – atomic radius – co- ordination number – packing factor for SC, BCC, FCC and HCP structures - crystal imperfections – point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

QUANTUM PHYSICS **9 Hours**

Introduction - Planck's quantum theory of black body radiation (derivation) - photo electric effect (qualitative description only) - Compton effect (derivation) and experimental verification of Compton effect - De-Broglie's concept - Schrodinger wave equation - time independent and time dependent equations (derivations) - physical significance of wave function - particle in a box (one dimensional case).

ACOUSTICS **9 Hours**

Classification of sound – characteristics of musical sound –loudness – Weber-Fechner law – decibel, phon – Reverberation – reverberation time – derivation of Sabine's formula for reverberation time (rate of growth and rate of decay) –Absorption coefficient and its

determination - sound absorbing materials - factors affecting acoustics of buildings and their remedies.

NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY **9 Hours**

New Engineering Materials: Metallic glasses - preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: synthesis - Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nano particles and applications. – Carbon nano tubes – fabrication - pulsed laser deposition - structure, properties & applications.

ATOMIC AND NUCLEAR PHYSICS **9Hours**

Introduction – Atomic spectra – Molecular spectra – Applications – Raman effect – Stokes lines and anti-stokes lines – Applications – Nuclear models – Liquid drop model –Nuclear fission –Theory – Energy released per fission – Chain reaction – Controlled chain reaction – Nuclear reactors – Condition for sustained chain reaction – Types of Nuclear reactors – Nuclear fusion –Thermo nuclear reactions – Differences between fission and fusion.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

25. Rajendran V., Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
26. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
27. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
28. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
29. Palinisamy P.K., Engineering Physics I, Scitech Publications, Chennai, 2011.
30. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi,2003.

U17PHT1006 **Physics for Circuit Engineering (Common to ECE & EEE)**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze and identify the crystal structure in materials

CO2: Apply the concepts of ultrasonics and NDT techniques and modern engineering tools necessary for engineering practice.

CO3: Perceive the basics of quantum physics.

CO4: Understand the concepts of electron balastics and fiber optic sources necessary for engineering practice.

CO5: Acquire the knowledge of the basics and different types of d optical fibers.

CO6: Describe the basic concepts of photo detectors for electron devices.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct

9. Continuous Assessment Test I, II
10. Group Presentation, Project report, Poster preparation, End Semester Examination

Indirect

1. Course-end survey

CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of inter-planar distances – atomic radius – co- ordination number – packing factor for SC, BCC, FCC and HCP structures - crystal imperfections – point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

ULTRASONICS AND NDT **9 Hours**

Ultrasonics: Production – magnetostriction generator – piezo electric generator –properties – detection – acoustic grating – velocity measurement – applications –SONAR.
NDT: Liquid penetrant method – ultrasonic flaw detector – A scan, B scan and C scan – X- ray radiography and fluoroscopy – thermography.

QUANTUM PHYSICS **9 Hours**

Introduction - Planck's quantum theory of black body radiation (derivation) - photo electric effect (qualitative description only) - Compton effect (derivation) and experimental verification of Compton effect - De-Broglie's concept - Schrodinger wave equation - time independent and time dependent equations (derivations) - physical significance of wave function - particle in a box (one dimensional case).

ELECTRON BALLISTICS AND FIBER OPTIC SOURCES **9 Hours**

Electron ballistics: Motion of charge in electric (uniform and time varying) and magnetic (uniform) fields - electrostatic deflection in CRT - parallel and perpendicular electric and magnetic fields - cyclotron.

Fiber optic sources: Direct and indirect band gap materials - LED structures - light source materials – quantum efficiency and LED power – modes and threshold conditions – Einstein rate equations - semiconductor laser – homo junction and hetro junction (qualitative description only).

OPTICAL FIBERS AND DETECTORS **9 Hours**

Optical fiber – principle and propagation of light in optical fibers – numerical aperture and acceptance angle – types of optical fibers – applications – fiber optic communication system **PIN Diode** – avalanche photo diodes – photo detector nose - Signal Noise Ratio (SNR) – detector response time – avalanche multiplication noise – comparison of photo diodes.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

31. Purcell E M, "Electricity and Magnetism – Berkeley Physics Course Vol. 2," Tata McGraw-Hill 2008.
32. Gerd Keiser, "Optical Fiber Communications", Tata McGraw-Hill 2012.
33. Jacob Millman, Christos C. Halkias and Sathyabrata Jit, Electronic Devices and Circuits, 3rd edition, Tata McGraw–Hill, 2011.
34. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
35. Palinisamy P.K., Engineering Physics I, Scitech Publications, Chennai, 2011.
36. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi,2003.
37. Gopal S., Engineering Physics, Inder Publications, 2006.

U17PHT1007 **Physics for Instrumentation Engineering**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze and identify the crystal structure and types in materials.

CO2: Explore the knowledge on the properties, production, and application of ultrasound.

CO3: Acquire the basic knowledge in quantum mechanics.

CO4: Imbibe the concept of optics, laser and their applications in engineering.

CO5: Categorize the optical fiber and apply it for various fields.

CO6: Understanding the basic principles of display technology.

Pre-requisites :

NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
11. Continuous Assessment Test I, II 12. Group Presentation, Project report, Poster preparation, End Semester Examination
Indirect
1. Course-end survey

CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of interplanar distances – Atomic radius – co- ordination number – Packing factor for SC, BCC, FCC and HCP structures-Natural crystal-Synthetic crystal-Piezoelectric crystal- X-cut, Y-cut, Z-cut crystals- crystal imperfections – point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

ULTRASONICS **9 Hours**

Introduction – production methods of ultrasonics – magnetostriction generator – piezo electric generator – properties – detection – cavitation effect –acoustical grating – velocity measurement – applications: SONAR –velocity of blood flow – Ultrasonic flaw detector – A scan, B scan, C scan.

QUANTUM PHYSICS **9 Hours**

Planck's quantum theory of black body radiation (derivation) - photo electric effect (qualitative description only) - Compton effect (derivation) and experimental verification of Compton effect - De-Broglie's concept - Schrodinger wave equation - time independent and time dependent equations (derivations) - physical significance of wave function - particle in a box (one dimensional case).

APPIED OPTICS **9 Hours**

Air wedge and its applications - Lasers – spontaneous and stimulated emissions – Einstein's coefficients – Types of laser – Nd : YAG, CO_2 and semiconductor laser – Homo junction (qualitative description) – applications – Holography (Qualitative only)

Optical fiber: Principle and propagation of light in optical fibers – numerical aperture and acceptance angle – types of optical fibers – Fabrication of optical fiber - Double crucible technique-Splicing-Losses in optical fiber – communication system.

OPTICAL MATERIALS **9 Hours**

Optical properties of semiconductors – Excitons- Traps – colourcentre – Types of colour centers– luminescence – fluorescence and phosphorescence - liquid crystal display – Dynamics scattering display – Twisted Nematic crystal display – Non- linear materials – second harmonic generation – optical mixing – optical phase conjugation.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

38. Calister, "Material Science and Engineering: An Introduction", 7th Edition, John Wiley and Sons, 2006.
39. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
40. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
41. Palanisamy P.K., Engineering Physics I, Scitech Publications, Chennai, 2011.
42. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
43. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
44. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
45. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015. 2

U17PHT1008 Physics for Fashion Technology

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze and identify the crystal structure in materials

CO2: Imbibe the concept of laser for its application in engineering.

CO3: Categorize the optical fiber and apply it for various fields.

CO4: Acquire the basic knowledge in quantum mechanics

CO5: Describe the impact of acoustic engineering solutions in a constructional, environmental, and societal context.

CO6: Apply the concepts of ultrasonics and NDT necessary for engineering practice.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
13. Continuous Assessment Test I, II 14. Group Presentation, Project report, Poster preparation, End Semester Examination
Indirect
1. Course-end survey

9 Hours

CRYSTAL PHYSICS

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of inter-planar distances – atomic radius – co- ordination number – packing factor for SC, BCC, FCC and HCP structures - crystal imperfections – point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

APPLIED OPTICS **9Hours**

Lasers: Introduction - Spontaneous and stimulated emissions – Einstein's coefficients Types of laser – Nd : YAG; CO_2 and semiconductor laser (Qualitative only) - applications – CD-ROM and holography (qualitative only).

Optical fibre: Principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – types of optical fibers – applications – fibre optic communication system

QUANTUM PHYSICS **9 Hours**

Introduction - Planck's quantum theory of black body radiation (derivation) - photo electric effect (qualitative description only) - Compton effect (derivation) and experimental verification of Compton effect - De-Broglie's concept - Schrodinger wave equation - time independent and time dependent equations (derivations) - physical significance of wave function - particle in a box (one dimensional case).

9 Hours

ACOUSTICS

Introduction - classification of sound – characteristics of musical sound –loudness –Weber-Fechner law –decibel- Reverberation – reverberation time –Sabines formula for reverberation time (Qualitative only) –Absorption coefficient and its determination – factors affecting acoustics of buildings –optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise and their remedies.

ULTRASONICS AND NDT **9 Hours**

Introduction - production — magnetostriction generator – piezo electric generator – properties –detection – acoustic grating – velocity measurement – applications –SONAR

NDT – liquid penetrant method – ultrasonic flaw detector – A scan, B scan and C scan – X-ray radiography and fluoroscopy – thermography.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

46. Calister, "Material Science and Engineering: An Introduction", 7th Edition, John Wiley and Sons, 2006.
47. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
48. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
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50. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
51. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
52. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
53. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015. 2

U17PHT1009 Physics for Mechanical Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Acquire the knowledge of conducting materials.

CO2: Perceive the preambles of semiconducting materials and categorize its applications.

CO3: Identify the superconducting materials for various engineering applications.

CO4: Categorize the different types of magnetic materials and their applications.

CO5: Enumerate the different types of polarization in dielectric materials.

CO6: Confer the preparation and properties of modern engineering materials and various composite materials.

Pre-requisites :

NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
15. Continuous Assessment Test I, II 16. Group Presentation, Project report, Poster preparation, End Semester Examination
Indirect
1. Course-end survey

CONDUCTING MATERIALS **9 Hours**

Introduction to Conductors – classical free electron theory of metals – Draw backs of classical theory - Electrical and Thermal conductivity of Metals – Derivation for Wiedemann – Franz law – Lorentz number — Fermi distribution function - effect of temperature – density of energy states – calculation of Fermi energy- carrier concentration in metals.

SEMI CONDUCTING MATERIALS **9 Hours**

Introduction – Properties – elemental and compound semiconductors - Intrinsic and extrinsic semiconductors – properties - Carrier concentration in intrinsic Semiconductor (Derivation) - variation of Fermi level with temperature and carrier concentration - Electrical Conductivity – band gap determination - extrinsic semiconductors - Carrier concentration in P- type and N- type semiconductors (Qualitative only) – variation of Fermi level with temperature and impurity concentration.

SUPER CONDUCTING MATERIALS **9 Hours**

Introduction – Superconducting state – magnetic properties of superconductors – Current flow and magnetic fields in superconductors – High current, High field superconductors - Types of superconductors - BCS theory of superconductivity (qualitative) – characteristics of superconductors - High Tc superconductors - Applications of superconductors - - SQUID, Cryotron and Magnetic levitation.

MAGNETIC AND DIELECTRIC MATERIALS **9 Hours**

Magnetic Materials: Properties of dia, para, ferro, anti-ferro and ferri magnetic materials – Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – Ferrites - Applications. **Dielectric Materials**: Electronic, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Dielectric loss – Internal field – ClausiusMossotti relation (Derivation) - Dielectric breakdown – different types of break down mechanism.

MODERN ENGINEERING AND COMPOSITE MATERIALS **9 Hours**

Modern Engineering Materials: Smart materials - Chromic materials – Rheological fluids – Shape memory alloys (SMA) – characteristics, applications advantages and disadvantages of SMA - properties of NiTi alloy. **Composite materials:** Types - production techniques - properties and applications of composites - advanced structure ceramics - Al_2O_3 and diamond.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

54. Richard Wolfson, Essential University Physics, Vols. 1 and 2. Pearson Education, Singapore, 2011.
55. William D Callister Jr, "Materials Science and Engineering – An Introduction", John Wiley and Sons Inc., 6thedition, New York, 2003.
56. Rajendran.V, "Materials Science",Tata McGraw- Hill,New Delhi,2011.
57. Rolf E. Hummel, "Electronic Properties of Materials", 4th ed., Springer, New York, 2011.
58. James F Shackelford, S "Introduction to materials Science for Engineers", 6th Macmillan Publishing Company, New York, 2004
59. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
60. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
61. Palanisamy P.K., Materials Science, Scitech Publications, Chennai, 2011.
62. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
63. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
64. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.

U17PHT1010 Physics for Mechatronics Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze and identify the crystal structure in materials

CO2: Comprehend the types of lasers, optical fibers and its applications.

CO3: Understand the dual nature of light and its applications.

CO4: Enumerate the principles and methods for the generation of ultrasonic waves.

CO5: Apply the NDT techniques as modern engineering tools for measurements.

CO6: Perceive the principles of electromagnetism.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
17. Continuous Assessment Test I, II 18. Group Presentation, Project report, Poster preparation, End Semester Examination
Indirect
1. Course-end survey

CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of interplanar distances – atomic radius – co- ordination number – packing factor for SC, BCC, FCC and HCP structures. Crystal imperfections: point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

APPLIED OPTICS **9 Hours**

Air wedge and its applications - Lasers – spontaneous and stimulated emissions – Einstein's coefficients – types of laser – Nd : YAG, CO_2 and semiconductor laser – Homo junction (qualitative description) – applications – Holography (Qualitative only).

Optical fiber: Principle and propagation of light in optical fibers – numerical aperture and acceptance angle –types of optical fibers – light sources and detectors – communication system.

QUANTUM PHYSICS **9 Hours**

Introduction - Planck's quantum theory of black body radiation (derivation) - photo electric effect (qualitative description only) - Compton effect (derivation) and experimental verification of Compton effect - De-Broglie's concept - Schrodinger wave equation - time independent and time dependent equations (derivation) - physical significance of wave function - particle in a box (one dimensional case).

ULTRASONICS AND NDT **9 Hours**

Ultrasonics: Production of ultrasonics - magnetostriction oscillator - piezo electric method – properties –detection – acoustic grating – applications - SONAR.

NDT: Liquid penetrant method – ultrasonic flaw detector: A scan, B scan and C scan – X-ray radiography and fluoroscopy – thermography.

ELECTROMAGNETISM **9 Hours**

Magnetic effects of electric current - magnetic fields - definition of fundamental terms. permeability - forces due to currents - uniform and non-uniform magnetic fields - static and time-varying magnetic fields - electromagnetic induction - expression for induced emf - Gauss theorem - electromagnetic waves - propagation of electromagnetic waves through isotropic media - Maxwell's equations and interpretation of Maxwell's equations.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

65. Richard Wolfson, ―Essential University Physics, Vols. 1 and 2. Pearson Education, Singapore, 2011.
66. Crawford Jr Waves, F.S. – Berkeley Physics Course, Vol. 3, 2008.
67. Purcell, E.M, ―Electricity and Magnetism – Berkeley Physics Course, Vol. 2, Tata McCraw-Hill ,2007.
68. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
69. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
70. Palanisamy P.K., Engineering Physics I, Scitech Publications, Chennai, 2011.
71. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
72. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
73. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
74. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015. 2

U17PHT1011 Physics for Textile Technology

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze and identify the crystal structure in materials.

CO2: Understand the concepts of optical properties for its various applications.

CO3: Comparison of different lasers and its applications in technology.

CO4: Understand the dual nature of light and its applications.

CO5: Understanding the core concepts of conductors.

CO6: Emphasis the factors affecting the acoustics and their remedies.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct

19. Continuous Assessment Test I, II
20. Group Presentation, Project report, Poster preparation, End Semester Examination

Indirect

1. Course-end survey

CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of interplanar distances – Atomic radius – co- ordination number – Packing factor for SC, BCC, FCC and HCP structures – X-ray diffraction-principle- crystallinity. Crystal imperfections: point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

APPLIED OPTICS **9 Hours**

Air wedge and its applications – reflection - specular and diffuse reflection - scattering-absorption - measurement of light intensity – refraction - refractive index of different materials – polarization - birefringence (Qualitative only) - Lasers – spontaneous and stimulated emissions – Einstein's coefficients – types of laser – Nd : YAG, CO_2 and semiconductor laser – Homo junction (Qualitative only) – applications –Holography (Qualitative only).

QUANTUM PHYSICS **9 Hours**

Introduction – Planck's quantum theory of black body radiation (derivation) – Photo electric effect(Qualitative only) – Compton effect (derivation) and experimental verification of Compton effect – De-Broglie's concept - Schrodinger wave equation – time independent and time dependent equations (derivations) – physical significance of wave function – particle in a box (one dimensional case) – Electron microscope – Scanning electron microscope – Transmission electron microscope.

CONDUCTING MATERIALS **9 Hours**

Classical free electron theory of metals-Electrical conductivity – Resistivity- Measurement of resistance- Thermal conductivity - expression – Wiedmann Franz law (derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy.

ACOUSTICS **9 Hours**

Classification of sound – characteristics of musical sound –loudness –Weber-Fechner law – decibel- Reverberation – reverberation time –Sabine's formula for reverberation time (Qualitative only) –Absorption coefficient and its determination – factors affecting acoustics of buildings –optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise and their remedies.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

75. Richard Wolfson, ―Essential University Physics, Vols. 1 and 2. Pearson Education, Singapore, 2011.
76. Avadhanulu M.N. andKshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
77. William D Callister Jr, "Materials Science and Engineering – An Introduction", John Wiley and Sons Inc., 6thedition, New York, 2003.
78. James F Shackelford, S "Introduction to materials Science for Engineers", 6th Macmillan Publishing Company, New York, 2004
79. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
80. Palanisamy P.K., Engineering Physics, Scitech Publications, Chennai, 2011.
81. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
82. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
83. Bhattacharya, D.K. & Poonam T., "Engineering Physics". Oxford University Press, 2015. 2

U17PHI1205 Physics for Computer Engineering (Common to CSE and IT)

L	T	P	J	C
3	0	2	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Choose the appropriate Laser technique for industrial & medical applications

CO2: Describe the different types, fabrication, losses of optical fibers and their applications in communication and instrumentation

CO 3: Express the properties and applications of the optical materials

CO 4: Explain the basics of semiconductors

CO 5: Classify the magnetic materials & demonstrate their applications in storage devices

CO 6: Explain the dual nature of particles and its applications

Pre-requisites :

NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M

Course Assessment methods

Direct

1. Continuous Assessment Test I, II (Theory component)
2. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation,
3. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (lab component)
4. Model examination (lab component)
5. End Semester Examination (Theory and lab component)

Indirect

1. Course-end survey

Theory Component contents

LASER SYSTEMS AND APPLICATIONS **9 Hours**

Lasers – spontaneous and stimulated emissions – Einstein's coefficients – Nd : YAG, CO_2 and semiconductor laser (Homo junction only) – Industrial applications: CD-ROM – Principle- Reading and Writing in CD Holography: Construction and Reconstruction of Holography-Differences of 2D and 3D photography.

FIBER OPTICS AND OPTICAL MATERIALS **9 Hours**

Fiber optics: Introduction – optical fiber – principle: Total Internal reflection- propagation of light in optical fibers – Numerical aperture and acceptance angle (derivation) – types of optical fibers –Splicing Technique. Applications: Fiber optic communication system-Medical Endoscopy.

Optical Materials: Optical properties of metals, insulators and semiconductors-liquid crystal display – Dynamics scattering display – Twisted nematic crystal display – LED-Thermography - Solar cell.

SEMICONDUCTING MATERIALS **9 Hours**

Semiconducting Materials: Origin of band gap in solids (Qualitative treatment only) - carrier concentration in an intrinsic semi conductor (derivation)- Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor. Extrinsic semiconductors (qualitative only) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC MATERIALS **9 Hours**

Properties of dia, para, ferro, anti ferro and ferri magnetic materials - Domain theory of ferro magnetism - hysteresis – soft and hard magnetic materials – Ferrites: structures, properties and applications. Magnetic recording and read out- Magnetic storage devices: magnetic tapes, magnetic disc drives-HD DVD and flash memory.

QUANTUM PHYSICS **9 Hours**

Introduction – Planck's quantum theory of black body radiation (derivation) – Photo electric effect (qualitative only) – Compton effect (derivation) and experimental verification of Compton effect – De-Broglie's concept - Schrodinger wave equation – time independent and time dependent equations (derivations) – physical significance of wave function – particle in a box (one dimensional case).

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015. 2.
2. Calister, "Material Science and Engineering: An Introduction", 7th Edition, John Wiley and Sons, 2006.
3. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
4. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
5. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers", Cengage Learning, 2010.
6. P.K.Palanisamy, "Semiconductor Physics and Optoelectronics". SCITECH Publications(India),2003
7. Garcia, N. & Damask, A. "Physics for Computer Science Students", Springer-Verlag, 2012.
8. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.

Lab component:

List of Experiments **30 Periods**

1. Determine thermal conductivity of the given cardboard by Lee's disc method.
2. Determine the thickness of a thin sheet by air wedge method.
3. Determine the co-efficient of viscosity of the given liquid by Poiseuille's flow method.
4. Determine the value of acceleration due to gravity by compound pendulum.

5. Calculate the solar panel efficiency by using lux meter.
6. Determine the wavelengths of the violet, blue, green and yellow in mercury spectrum using spectrometer grating method (the green spectral line for which the wavelength is 5461 A^0).
7. Determine Young's modulus of the given bar using non-uniform bending method.
8. Calculate the frequency of the given tuning fork by longitudinal and transverse mode of vibrational methods.
9. Determine the velocity of ultrasonic sound and compressibility of the given liquid by using ultrasonic interferometer.
10. By using semiconductor laser determine: i) Wavelength of LASER using grating. ii) Acceptance angle & numerical aperture of optical fiber (grating element: N=5,00,000 lines/meter).

Theory: 0	**Tutorial: 0**	**Practical:30**	**Project: 0**	**Total: 30 Hours**

REFERENCES

1. Laboratory Manual of Engineering Physics by Dr. Y. Aparna & Dr. K. Venkateswara Rao (V.G.S Publishers)
2. "Practical Physics", G.L. Squires, Cambridge University Press, Cambridge, 1985. 11. 12.
3. "Great Experiments in Physics", M.H. Shamos, Holt, Rinehart and Winston Inc., 1959.
4. "Experiments in Modern Physics", A.C. Melissinos, Academic Press, N.Y., 1966. Gupta S.C, and Kapur, J.N.

U17PHP1501 **Physics laboratory (Common to AE, AU, BT, CE, CS, IT, MC,TX)**

L	T	P	J	C
0	0	2	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Determine different physical properties of a material like thermal conductivity, thickness of the material.

CO2: Perform experiments involving the physical phenomena like interference and diffraction

CO3: Apply physical theories in real life situations by also taking into account its limitation.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		M	S									
CO3		S		M								

Course Assessment methods

Direct

1. Pre-or Post-experiment Test/Viva; Experimental Report for each experiment; Model Examination
2. End Semester Examination

Indirect

1. Course-end survey

List of Experiments **30 Hours**

1. Determine thermal conductivity of the given cardboard by Lee's disc method.
2. Determine the thickness of a thin sheet by air wedge method.
3. Determine the co-efficient of viscosity of the given liquid by Poiseuille's flow method.
4. Determine the value of acceleration due to gravity by compound pendulum.
5. Calculate the solar panel efficiency by using lux meter.
6. Determine the wavelengths of the violet, blue, green and yellow in mercury spectrum using spectrometer grating method (the green spectral line for which the wavelength is 5461 A^0).
7. Determine Young's modulus of the given bar using non-uniform bending method.
8. Calculate the frequency of the given tuning fork by longitudinal and transverse mode of vibrational methods.
9. Determine the velocity of ultrasonic sound and compressibility of the given liquid by using ultrasonic interferometer.
10. By using semiconductor laser determine: i) Wavelength of LASER using grating. ii) Acceptance angle & numerical aperture of optical fiber (grating element: N=5,00,000 lines/meter).

Theory: 0 Tutorial: 0 Practical: 30 Project: 0 Total: 30 Hours

REFERENCES

5. Laboratory Manual of Engineering Physics by Dr. Y. Aparna & Dr. K. Venkateswara Rao (V.G.S Publishers)
6. "Practical Physics", G.L. Squires, Cambridge University Press, Cambridge, 1985. 11. 12.
7. "Great Experiments in Physics", M.H. Shamos, Holt, Rinehart and Winston Inc., 1959.
8. "Experiments in Modern Physics", A.C. Melissinos, Academic Press, N.Y., 1966. Gupta S.C, and Kapur, J.N.

U17PHT2001 Material science for Aeronautical Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Recognize the core concepts of conducting materials.

CO2: Perceive the preambles, types of semiconductors and to conceive the Hall effect along with its applications

CO3: Categorize the magnetic materials based on their properties

CO4: Understand the mechanism of dielectrics and its engineering applications

CO5: Analyze the properties of different aircraft materials and Compare the properties of various alloys for aerospace application

CO6: Conduct the Heat treatment and surface treatment process for various alloys

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M										M
CO3	S	M										M
CO4	S	M										M
CO5	S	M			M							M
CO6	S	M										M

Course Assessment methods

Direct

21. Continuous Assessment Test I, II
22. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation
23. End Semester Examination

Indirect

1. Course-end survey

CONDUCTING MATERIALS 9 Hours

Classical free electron theory of metals-electrical conductivity – thermal conductivity - expression – Wiedemann Franz law(derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy.

SEMICONDUCTING MATERIALS 9 Hours

Origin of band gap in solids (qualitative treatment only) - carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature -

Electrical conductivity – band gap semiconductor – extrinsic semiconductor(qualitative only) – variation of Fermi level with temperature and impurity concentration – Hall effect – determination of Hall coefficient – experimental set up – applications.

MAGNETIC AND DIELECTRIC MATERIALS **9 Hours**

Magnetic Materials: Properties of dia, para, ferro, anti ferro and ferri magnetic materials – Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials.

Dielectric materials: Electronic, ionic, orientation and space charge polarization - frequency and temperature dependence of polarization – dielectric loss –Internal field – Clasius-Mossotti relation– dielectric breakdown – different types of break down mechanism.

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INTRODUCTION TO AIRCRAFT MATERIALS **9 Hours**

General properties of materials, Requirements of aircraft materials, Testing of aircraft materials, Inspection methods (NDT) (Qualitative only), Application trends in aircraft structures and engines, Introduction to smart materials and Nano-materials, Selection criteria of materials for use in aircraft. Ablation process, ablative materials and applications in aerospace – Phenomenon of super conduction, super conducting materials and applications in aerospace (Qualitative only).

AIRCRAFT METAL ALLOYS AND SUPERALLOYS **9 Hours**

Aluminum alloys, Magnesium alloys, Titanium alloys, Plain carbon and Low carbon Steels, Corrosion and Heat resistant steels, Maraging steels, Copper alloys, Producibility and Surface treatments for each of the above – Super alloys, Nickel based super alloys, Cobalt based super alloys, and Iron based super alloys, manufacturing processes associated with super alloys, Heat treatment and surface treatment of super alloys.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi, 2003.
2. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
3. William D CallisterJr, ―Materials Science and Engineering-An Introduction‖, John Wiley and Sons Inc., Sixth Edition, New York, 2010.
4. Van Vlack, ―Elements of Material Science and Engineering‖, Pearson Education India, 2008.
5. Raghavan V. Materials Science and Engineering, Prentice Hall of India Pvt. Ltd., 1999
6. George Francis Titterton, 'Aircraft Material and Processes', Fifth Edition, Sterling Book House, Mumbai, 1998.
7. C G Krishnadas Nair, 'Handbook of Aircraft Materials', First Edition, Interline Publishers, Bangalore, 1993
8. Rajendran V. and Marikani A., Materials science, 5th edition, Tata Mc-Graw-Hill publishing company Ltd., 2004
9. James F Shackelford S, ―Introduction to Materials Science for Engineers‖, Third Edition, Macmillan Publishing Company, New York. 1992
10. Gopal S., Materials Science, Inder Publications, Coimbatore, 2007.

U17PHT2002 **Material Science for Automobile Engineering**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Recognize the core concepts of conducting materials.

CO2: Perceive the preambles, types of semiconductors and to conceive the Hall effect along with its applications

CO3: Categorize the magnetic materials based on their properties**.**

CO4: Elucidate the basics of superconductors and its applications

CO5: Understand the mechanism of dielectrics and its engineering applications.

CO6: Confer the properties, preparation and applications of new engineering materials and nano materials.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M										M
CO3	S	M										M
CO4	S	M										M
CO5	S	M			M							M
CO6	S	M										M

Course Assessment methods

Direct
24. Continuous Assessment Test I, II 25. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation 26. End Semester Examination
Indirect
1. Course-end survey

CONDUCTING MATERIALS **9 Hours**

Classical free electron theory of metals-electrical conductivity – thermal conductivity - expression – Wiedemann Franz law(derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy.

SEMICONDUCTING MATERIALS **9 Hours**

Origin of band gap in solids (qualitative treatment only) - carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - electrical conductivity – band gap semiconductor –extrinsic semiconductor(Qualitative only)

– variation of Fermi level with temperature and impurity concentration – Hall effect – determination of Hall coefficient – experimental set up – applications.

MAGNETIC AND SUPERCONDUCTING MATERIALS **9 Hours**

Magnetic materials: Properties of dia, para, ferro, anti-ferro and ferri magnetic materials – domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – ferrites – applications.

Superconducting materials: Superconducting phenomena – properties of superconductors – Meissner effect, isotopic effect. Type I &Type II superconductors – high Tc superconductors- applications: cryotron, magnetic levitation and squids.

DIELECTRIC MATERIALS **9 Hours**

Electronic, ionic, orientation and space charge polarization - frequency and temperature dependence of polarization – dielectric loss –Internal field – Classius - Mossotti relation– dielectric breakdown – different types of break down mechanism - ferro electric materials - properties and applications.

NEW ENGINEERING MATERIALS AND NANO TECHNOLOGY **9 Hours**

New engineering materials: metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics- properties of NiTi alloy applications, advantages and disadvantages of SMA.

Nano materials: synthesis – chemical Vapour deposition – sol – gel, electro deposition— ball milling –properties of nano particles and applications – carbon nano tubes – fabrication method – pulsed laser deposition – structure, properties and applications.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

11. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi, 2003.
12. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
13. William D CallisterJr, ―Materials Science and Engineering-An Introduction‖, John Wiley and Sons Inc., Sixth Edition, New York, 2010.
14. Van Vlack, ―Elements of Material Science and Engineering‖, Pearson Education India, 2008.
15. Raghavan V. Materials Science and Engineering, Prentice Hall of India Pvt. Ltd., 1999
16. Rajendran V. and Marikani A., Materials science, 5th edition, Tata Mc-Graw-Hill publishing company Ltd., 2004
17. James F Shackelford S, ―Introduction to Materials Science for Engineers‖, Third Edition, Macmillan Publishing Company, New York. 1992
18. Gopal S., Materials Science, Inder Publications, Coimbatore, 2007.

U17PHT2003 Materials Science for Civil Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Explore the knowledge on the properties, production, and application of ultrasound.

CO2: Apply the NDT techniques and modern engineering tools necessary for Engineering practice

CO3: Categorize the magnetic materials based on their properties.

CO4: Understand the mechanism of dielectrics and its engineering applications.

CO5: Practice green energy concepts in the energy generation.

CO6: Obtain knowledge about geothermal energy and biomass.

Pre-requisites : NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M										M
CO3	S	M										M
CO4	S	M										M
CO5	S	M			M							M
CO6	S	M										M

Course Assessment methods

Direct
27. Continuous Assessment Test I, II 28. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation 29. End Semester Examination
Indirect
1. Course-end survey

ULTRASONICS AND NDT — 9 Hours

Ultrasonics: Production of ultrasonics - magnetostriction oscillator - piezo electric method –properties –detection – acoustic grating – applications - SONAR.

NDT: Liquid penetrant method – ultrasonic flaw detector: A scan, B scan and C scan – X-ray radiography and fluoroscopy – thermography.

MAGNETIC MATERIALS — 9 Hours

Properties of dia, para, ferro, anti ferro and ferri magnetic materials - Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – Ferrites – properties - Applications

DIELECTRIC MATERIALS — 9 Hours

Electronic, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Dielectric constant, Dielectric loss – Internal field – Classius –

Mossotti equation- Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.

GREEN ENERGY PHYSICS **9 Hours**

Introduction to Green energy – Solar energy: Energy conversion by photovoltaic principle – Solar cells – Wind energy: Basic components and principle of windenergy conversion systems – Ocean energy: Wave energy – Wave energy conversion devices – Tidal energy – single and double basin tidal power plants – Ocean Thermal Electric Conversion (OTEC)

GEOTHERMAL ENERGY AND BIOMASS **9 Hours**

Geothermal energy: Geothermal sources (hydrothermal, geo-pressurized hot dry rocks, magma) – Biomass: Biomass and bio-fuels – bio-energies from wastages – Fuel cells : H_2O_2 – Futuristic Energy: Hydrogen – Methane Hydrates – Carbon capture and storage (CCS).

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi, 2003.
2. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
3. William D CallisterJr, ―Materials Science and Engineering-An Introduction‖, John Wiley and Sons Inc., Sixth Edition, New York, 2010.
4. Van Vlack, ―Elements of Material Science and Engineering‖, Pearson Education India, 2008.
5. Raghavan V. Materials Science and Engineering, Prentice Hall of India Pvt. Ltd., 1999
6. Rajendran V. and Marikani A., Materials science, 5th edition, Tata Mc-Graw-Hill publishing company Ltd., 2004
7. James F Shackelford S, ―Introduction to Materials Science for Engineers‖, Third Edition, Macmillan Publishing Company, New York. 1992
8. Gopal S., Materials Science, Inder Publications, Coimbatore, 2007.
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10. Engg. Physics by K. Rajagopal, Prentice Hall of India Pvt. Ltd.

U17PHT2004 **Materials Science for Circuit Engineering (Common to ECE & EEE)**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand the core concepts of conductors.

CO2: Explain the behavior of semiconductors and its applications

CO3: Differentiate the structure and physical properties of magnetic materials.

CO4: Explain the basics of superconductors and its applications

CO5: Understand the mechanism of dielectrics and its applications

CO6: Study of nano materials, new engineering materials and their properties with applications.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M										M
CO3	S	M										M
CO4	S	M										M
CO5	S	M			M							M
CO6	S	M										M

Course Assessment methods

Direct
30. Continuous Assessment Test I, II 31. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation 32. End Semester Examination
Indirect
1. Course-end survey

CONDUCTING MATERIALS **9 Hours**

Classical free electron theory of metals-Electrical conductivity – Thermal conductivity - expression – Wiedemann Franz law(derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy.

SEMICONDUCTING MATERIALS **9 Hours**

Origin of band gap in solids (Qualitative treatment only) – wide band gap semiconductors (GaAs, InP) - carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – Extrinsic semi conductors (Qualitative treatment only) – Doping

(definition, methods & types) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC AND SUPERCONDUCTING MATERIALS **9 Hours**

Magnetic materials: Properties of dia, para, ferro, anti ferro and ferri magnetic materials - Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – Ferrites – properties - Applications

Superconducting materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

DIELECTRIC MATERIALS **9 Hours**

Electronic, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Dielectric constant, Dielectric loss – Internal field – Classius – Mossotti equation- Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.

NEW ENGINEERING MATERIALS AND NANO MATERIALS **9 Hours**

New engineering materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: Synthesis - chemical vapour deposition – sol-gel - electro deposition – ball milling – properties of nano particles and applications. – carbon nano tubes – fabrication - pulsed laser deposition - structure, properties & applications.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi, 2003.
2. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
3. Raghavan V. Materials Science and Engineering, Prentice Hall of India Pvt. Ltd., 1999
4. Rajendran V. and Marikani A., Materials science, 5th edition, Tata Mc-Graw-Hill publishing company Ltd., 2004
5. James F Shackelford S, ―Introduction to Materials Science for Engineers‖, Third Edition, Macmillan Publishing Company, New York. 1992
6. Halliday, Krane Resnick, Physics, Vol 2, 5ed., John Wiley & sons (Asia) Pte Ltd., 2007.
7. Palanisamy P.K., Materials Science, 2nd Edition, Scitech Pub. India, Pvt. Ltd., Chennai, 2003
8. Gopal S., Materials Science, Inder Publications, Coimbatore, 2007.
9. Engg. Physics by K. Rajagopal, Prentice Hall of India Pvt. Ltd.

U17PHT2005 Materials Science for Instrumentation Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand the core concepts of conductors.
CO2: Explain the behavior of semiconductors and its applications
CO3: Differentiate the structure and physical properties of magnetic materials.
CO4: Explain the basics of superconductors and its applications
CO5: Understand the mechanism of dielectrics and its applications
CO6: Study of nano materials & new engineering materials and their properties with applications.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M			M							M
CO3	S	M										M
CO4	S	M										M
CO5	S	M										M
CO6	S	M			M							M

Course Assessment methods

Direct
33. Continuous Assessment Test I, II 34. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation 35. End Semester Examination
Indirect
1. Course-end survey

CONDUCTING MATERIALS 9 Hours

Classical free electron theory of metals-Electrical conductivity – Thermal conductivity - expression – Wiedemann Franz law (derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy.

SEMICONDUCTING MATERIALS 9 Hours

Origin of band gap in solids (Qualitative treatment only) - carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor — Extrinsic semiconductor(Qualitative only)- Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC AND SUPERCONDUCTING MATERIALS **9 Hours**

Magnetic materials: Properties of dia, para, ferro, anti ferro and ferri magnetic materials - Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – Ferrites – Applications - magnetic storage devices- Tapes, magnetic disc drives – Bubble memory.

Superconducting materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

DIELECTRIC MATERIALS **9 Hours**

Electronic, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization –Internal field –Clausius mossotte equation- Dielectric loss – Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.

NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY **9 Hours**

New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: synthesis - Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nano particles and applications. – Carbon nano tubes – fabrication - pulsed laser deposition - structure, properties & applications.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Halliday D., Resnick R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Calister, "Material Science and Engineering: An Introduction", 7th Edition, John Wiley and Sons, 2006.
3. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
4. Palanisamy P.K., Materials Science, 2nd edition, Scitech Pub. India, (P) Ltd., Chennai, 2003.
5. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
6. Rajendran V, Materials science, 5th edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
7. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand & Company Ltd, New Delhi,2005.
8. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.

U17PHT2006 **Materials Science for Fashion Technology**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1 Acquire the knowledge of conducting materials and its applications.
CO2 Perceive the preambles of semiconductors and categorize its applications.
CO3 Categorize the different types of magnetic and superconducting materials.
CO4 Enumerate the different types of polarization in dielectric materials.
CO5 Confer the properties, preparation and applications of modern engineering materials.
CO6 Identify methods for etching of fabrics.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M										M
CO3	S	M										M
CO4	S	M										M
CO5	S	M										M
CO6	S	M			M							M

Course Assessment methods

Direct

36. Continuous Assessment Test I, II
37. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation
38. End Semester Examination

Indirect

1. Course-end survey

CONDUCTING MATERIALS **9 Hours**

Classical free electron theory of metals-Electrical conductivity – Thermal conductivity - expression – Wiedemann Franz law(derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy.

SEMICONDUCTING MATERIALS **9 Hours**

Origin of band gap in solids (Qualitative treatment only) - carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – Extrinsic semi conductors (Qualitative treatment only) – doping (definition, methods & types) – variation of Fermi level with temperature and impurity concentration – Hall effect – determination of Hall coefficient – experimental set up – applications.

MAGNETIC AND SUPERCONDUCTING MATERIALS **9 Hours**

Magnetic materials: Properties of dia, para, ferro, anti ferro and ferri magnetic materials - Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – Ferrites – properties - Applications

Superconducting materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

DIELECTRIC MATERIALS **9 Hours**

Electronic, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Dielectric constant, Dielectric loss – Internal field – Classius – Mossotti equation- Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.

NEW ENGINEERING MATERIALS AND PLASMA TECHNOLOGY **9 Hours**

Metallic glasses: Preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Plasma Technology: Properties of plasma- types of plasma- thermal and non thermal plasma-Production of glow discharge plasma-Cold plasma- applications in textile and biomedical field.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Halliday D., Resnick R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Calister, "Material Science and Engineering: An Introduction", 7th Edition, John Wiley and Sons, 2006.
3. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
4. Palanisamy P.K., Materials Science, 2nd edition, Scitech Pub. India, (P) Ltd., Chennai, 2003.
5. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
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8. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
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U17PHT2007 Materials Science for Mechanical Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze and identify the crystal structure in materials.
CO2: Perceive the preambles of solid solutions.
CO3: Categorize the ferrous and non ferrous alloys based on their properties.
CO4: Elucidate the various process of heat treatment.
CO5: Understand the mechanical properties of materials for its engineering applications.
CO6: Recognize the basic concepts of testing of materials.

Pre-requisites : NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M										M
CO3	S	M										M
CO4	S	M										M
CO5	S	M			M							M
CO6	S	M										M

Course Assessment methods

Direct

39. Continuous Assessment Test I, II
40. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation
41. End Semester Examination

Indirect

1. Course-end survey

CRYSTALLOGRAPHY 9 Hours

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of interplanar distances – Atomic radius – co- ordination number – Packing factor for SC, BCC, FCC and HCP structures – crystal imperfections – point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

SOLID SOLUTIONS 9 Hours

Phase, Gibbs's Phase rule, Solubility and Solid Solutions - Iso-morphous alloy system - Binary Eutectic alloy system (Lead-Tin System), Eutectoid and Peritectic system, Iron-Iron carbide phase diagram- Invariant reactions, Evolution of Microstructure, Phase Transformation-Temperature-Time-Transformation (TTT) and Continuous Cooling Transformation (CCT) Diagrams - Steels, Cast Irons and Stainless steels – types and applications – Effects of alloying elements.

FERROUS AND NON-FERROUS ALLOYS **9 Hours**

Non Ferrous Alloys of Aluminum, Magnesium, Copper, Nickel, Titanium – Microstructure and mechanical property relationships; Composites – Classification, Processing, Metal Matrix, Ceramic Matrix, polymer matrix – properties and applications; Ceramics – Alumina, Zirconia, Silicon Carbide, Sialons, Reaction Bonded Silicon Nitride(RBSN), Processing, properties and applications of ceramics, Glasses – properties and applications.

HEAT TREATMENT AND MECHANICAL PROPERTIES OF MATERIALS **9 Hours**

Heat Treatment: Annealing and its types, Normalizing, Aus-tempering, Mar-tempering, Quenching and Temper heat treatment, Hardenability – Basic concepts of wear and corrosion & their types - Surface hardening processes – Flame and induction hardening, Carburizing, Nitriding and Carbo-nitriding.

MECHANICAL PROPERTIES OF MATERIALS

Tension, Compression, Shear and Torsional Test of Metals -Stress-strain behaviour of ferrous & non-ferrous metals, polymer and ceramics - True stress and strain relations.

TESTING OF MATERIALS **9 Hours**

Flexural Test, Hardness measurement tests, Fracture of metals - Ductile Fracture, Brittle Fracture, Fatigue – Endurance limit of ferrous and non-ferrous metals – Fatigue test; Creep and stress rupture– mechanism of creep – stages of creep and creep test, Strengthening mechanisms.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Kenneth G.Budinski and Michael K.Budinski "Engineering Materials" Prentice-Hall of India Private Limited, 4thIndian Reprint 2002.
2. WoleSoboyejo, "Mechanical Properties of Engineered Materials", Marcel DekkerInc., 2003.
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4. O.P.Khanna "Material Science And Metallurgy", DhanpatRaiPublication ,2011
5. William D Callister "Material Science and Engineering", Wiley India pvt Ltd 2007.
6. Avner, S.H., Introduction to Physical Metallurgy, 2nd ed., McGraw-Hill Inc., 1976.

U17PHT2008 **Materials Science for Mechatranics Engineering**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand the core concepts of conductors.
CO2: Explain the behavior of semiconductors and its applications
CO3: Differentiate the structure and physical properties of magnetic materials.
CO4: Understand the mechanism of dielectrics and its applications
CO5: Elucidate the various process of heat treatment.
CO6: Study of composite & new engineering materials, their properties with applications.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	M					M						
CO2	M											
CO3	W	M				M						
CO4	S		M			M						
CO5	S											
CO6	M											

Course Assessment methods

Direct
42. Continuous Assessment Test I, II 43. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation 44. End Semester Examination
Indirect
1. Course-end survey

CONDUCTING MATERIALS **9 Hours**

Classical free electron theory of metals-electrical conductivity – thermal conductivity - expression – Wiedemann Franz law(derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy.

SEMICONDUCTING MATERIALS **9 Hours**

Origin of band gap in solids (Qualitative treatment only) - carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - electrical conductivity – band gap –Extrinsic semiconductor(Qualitative only) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – applications.

MAGNETIC AND DIELECTRIC MATERIALS **9 Hours**

Magnetic materials: Properties of dia, para, ferro, anti ferro and ferri magnetic materials – Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – ferrites – applications.

Dielectric materials: Electronic, ionic, orientation and space charge polarization - frequency and temperature dependence of polarization – dielectric loss –internal field – Classius Mossotti relation– dielectric breakdown – different types of break down mechanism - ferro electric materials - properties and applications

HEAT TREATMENT **9 Hours**

Definition – annealing types – normalizing, hardening and tempering of steel - isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR - hardenability, Jominy end quench test – austempering, martempering – case hardening - types.

COMPOSITE AND NEW ENGINEERING MATERIALS **9 Hours**

Composite materials: Types - production techniques - properties and applications of composites - advanced structure ceramics - Al_2O_3 and diamond.

Shape memory alloys (SMA): Characteristics – applications - advantages and disadvantages of SMA - properties of NiTi alloy.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Halliday D., Resnick R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Calister, "Material Science and Engineering: An Introduction", 7th Edition, John Wiley and Sons, 2006.
3. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
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5. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
6. Rajendran V, Materials science, 5th edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
7. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand & Company Ltd, New Delhi,2005.
8. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
9. Van Vlack, ―Elements of Material Science and Engineering‖, Pearson Education India, 2008.

U17PHP2501 **Physics laboratory**
(Common to EC, EE, EI, FT, ME)

L	T	P	J	C
0	0	2	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Determine different physical properties of a material like thermal conductivity, thickness of the material.

CO2: Perform experiments involving the physical phenomena like interference and diffraction

CO3: Apply physical theories in real life situations by also taking into account its limitation.

Pre-requisites :

NIL

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		M	S									
CO3		S		M								

Course Assessment methods

Direct
3. Pre-or Post-experiment Test/Viva; Experimental Report for each experiment; Model Examination 4. End Semester Examination
Indirect
1. Course-end survey

List of Experiments **30 Hours**

11. Determine thermal conductivity of the given cardboard by Lee's disc method.
12. Determine the thickness of a thin sheet by air wedge method.
13. Determine the co-efficient of viscosity of the given liquid by Poiseuille's flow method.
14. Determine the value of acceleration due to gravity by compound pendulum.
15. Calculate the solar panel efficiency by using lux meter.
16. Determine the wavelengths of the violet, blue, green and yellow in mercury spectrum using spectrometer grating method (the green spectral line for which the wavelength is 5461 A^0).
17. Determine Young's modulus of the given bar using non-uniform bending method.
18. Calculate the frequency of the given tuning fork by longitudinal and transverse mode of vibrational methods.
19. Determine the velocity of ultrasonic sound and compressibility of the given liquid by using ultrasonic interferometer.
20. By using semiconductor laser determine:
    i) Wavelength of LASER using grating.

ii) Acceptance angle & numerical aperture of optical fiber (grating element: N=5,00,000 lines/meter).

21.

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 Hours**

REFERENCES

1. Laboratory Manual of Engineering Physics by Dr. Y. Aparna & Dr. K. Venkateswara Rao (V.G.S Publishers)
2. "Practical Physics", G.L. Squires, Cambridge University Press, Cambridge, 1985. 11. 12.
3. "Great Experiments in Physics", M.H. Shamos, Holt, Rinehart and Winston Inc., 1959.
4. "Experiments in Modern Physics", A.C. Melissinos, Academic Press, N.Y., 1966. Gupta S.C, and Kapur, J.N.