20PEB202					Applied Physics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	1	-	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- 1 To impart knowledge in basic concepts of physics relevant to engineering applications
- 2 To introduce advances in technology for engineering applications
- 3 To introduce students to concepts of Classical and Quantum Mechanics
- 4 To introduce students to recognise the techniques of processing advanced engineering materials

UNIT 1 NANOPHYSICS **07 Hrs.**

Nanoscale, Surface to volume ratio, Surface effects on Nanomaterials, Quantum size effects, Electron confinement, Nanomaterials and Nanotechnology, Unusal properties of Nanomaterials, Disadvantages of Nanomaterials Synthesis of Nanomaterials, Carbon Nanotubes: Introduction, Structure, Synthesis, Properties and applications, Applications of Nanomaterials in Petroleum Engineering.

UNIT 2 CLASSICAL MECHANICS **07 Hrs.**

Review of Newtonian mechanics in rectilinear coordinate system. Motion in plane polar coordinates. Conservation Principles. Collision problem in laboratory and centre of mass frame. Rotation about fixed axis. Non inertial frames and pseudo forces. Rigid body dynamics.

UNIT 3 QUANTUM MECHANICS **06 Hrs.**

Two-slit experiment. De-broglie's hypothesis. Uncertainty principle, wave function and wave packets, phase and group velocities,Schrodinger Equation. Probabilities and Normalization. Expectation Values. Application in one dimension: Particle in a box, Finite potential well, Harmonic Oscillator

UNIT 4 ADVANCED ENGINEERING MATERIALS **06 Hrs.**

SHAPE MEMORY ALLOYS: Introduction, Synthesis, Properties and Applications.
METALLIC GLASSES: Introduction, Synthesis, Properties and Applications
BIO MATERIALS: Introduction, Properties and Applications
ENERGY MATERIALS: Solar cells, Fuel cells (H2O2, Lithium cell), Ultra capacitors.

Total 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Summarize the fundamentals of nanophysics including synthesis of nanomaterials for its use in energy industry
CO2 - Appraise the application of knowledge of Nanomaterials in Petroleum Engineering problems
CO3 - Able to apply basics of Newtonian mechanics and conversional principles.
CO4 - Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system.
CO5 - Appraise the synthesis and application of shape metal alloys, and metallic glasses for application in Petroleum Industry.
CO6 - Evaluate the use of Bio materials and solar cells for energy.

TEXT/REFERENCE BOOKS

1. Resnick, Halliday and Krane, Physics part I and II, 5th Edition John Wiely (2002).
2. A. Ghatak, Optics, 3rd edition, Tata McGraw Hill (2005).
3. Kittel C., Knight W.O. and Ruderman M.A., Mechanics - Berkeley Physics Course, Vol. 1, Tata McGrawHill.
4. Purcell E.M. Electricity and Magnetism - Berkeley Physics Course, Vol.2, TataMcGraw-Hill.
5. Crawford F.S. - Waves and Oscillations, Berkeley Physics Course, Vol. 3,McGraw-Hill.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**
PART A: <Question: <Short Notes, Problems, Numerical> **20 Marks**
PART B: <Justification, Criticism, Long answers, Interpretation > **80 Marks**