20PEB103					PHYSICS					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- Demonstrate the fundamentals of vector, electrostatics wave theory and optics.
- Enhance knowledge to relate physics with advanced courses of petroleum engineering.
- Improve skills to interpret real world problems with physical significance
- Develop understanding of wave theory for application in geophysical exploration

Unit I **Hours: 7**

Vector concepts & applications in Physics: Introduction to vector algebra, Physical concepts in vector fields and Scalar fields with examples, Physical and mathematical concepts of gradient, divergence and curl, Green's theorem, Gauss theorem, applications in gravitation and electrostatics. Stokes' theorem and its applications.

Electrostatics and Electrodynamics: Gauss's law in dielectric medium, Equation of continuity, Biot Savart law – Ampere's law – magnetization and magnetic intensity, Faraday's law of induction – generalization of Ampere's law, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem & Poynting vector.

Unit II **Hours: 6**

Waves and Oscillations: Types of waves, Simple harmonic motion, Damped simple harmonic motion, types of damping, Forced oscillation, resonance, Energy Transport in Wave motion.

Acoustics & Ultrasonic: Introduction to Sound, Sabine's reverberation theory, Acoustical defects and their remedies, Doppler Effect. Ultrasonic waves, methods of their generation and detection, properties and application of ultrasonic waves.

Unit III **Hours: 7**

Kinematics and Dynamics: Kinematics and dynamics of particles, work and energy system of particles, rotational kinematics and dynamics.

Optics: Interference: Types of interferences, Thin film interference, Anti-reflecting films; wedge shape films; Newton's rings and its applications, Diffraction: Diffraction of light waves, Fraunhofer diffraction at a single slit, Two slit Fraunhofer Diffraction Pattern, N- Slit Fraunhofer Diffraction Pattern, diffraction grating, resolving power, Rayleigh Criterion, Fresnel diffraction (Introduction). Polarization: Polarization of light, production of polarized light, types of polarization and their representation, Malus's law, polarizer and analyser, Double refraction, Interference of Polarized light: Quarter wave plates and Half wave plates.

Unit IV **Hours: 6**

Laser & Fibre Optics: Concepts of maser and laser, Interaction of radiation of matter-quantum mechanical view, Einstein coefficients spontaneous and stimulated emission, principles involves in laser, Meta stable state, Population inversion, three and four level laser system, and optical amplification and optical resonator, characteristics of laser, Ruby, He-Ne and semiconductor lasers, Application of lasers, Optical Fiber, physical structure and basic theory, modes in optical fibers, step index and graded index fibers, losses in optical fibers, applications of optical fibers in communication.

MAX <30 Hrs>

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Demonstrate an understanding of Electrodynamics, Waves theory, kinematics & dynamics and optics.

CO2- Apply the techniques of vector calculus in gravitation and electrostatics

CO3- Demonstrate various diffraction experiments

CO4- Apply sound wave interference knowledge in seismic interpretation.

CO5- Analyze and evaluate the different wave interference.

CO6- Create an interest to apply physics to solve various real-world problems.

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.
6. Feyman R.P., Leighton R.B. and Sands M. The Feyman Lectures on Physics, Vol. 1., Narosa Publication
7. Feyman R.P., Leighton R.B. and Sands M. The Feyman Lectures on Physics, Vol. 2. Narosa Publication
8. Griffith D.J.H., Introduction to Electrodynamics - Prentice Hall, India.
9. M. N. Avadhanulu, A text book of engineering Physics, S. Chand & Company, Ltd.
10. Brij Lal, N. Subrahmanyam, Heat and Thermodynamics, S. Chand & Company, Ltd.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 10 Questions of 2 marks each-No choice **20 Marks**

PART B: 2 Questions from each unit with internal choice, each carrying 16 marks **80 Marks**