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***ROLL NO: 60.***

***SUBJECT: PHYSICS.***

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***SECTION: A.***

***ABSTRACTS:***

1) The electromagnetic and microwave absorption properties of the carbonyl iron/TiC hybrid powders are studied in the X band. A favorable microwave absorption property can be obtained by changing the ratio of carbonyl iron (CI) and TiC. The results of the study indicated that the CI/TiC(Titanium carbide) hybrid powders with appropriate ratio are favorable for application in the X band as microwave absorption absorbent owing to integrating the dielectric absorbent and magnetic absorbent.

2) In this paper, the mathematical model of solenoid valve in the fuel injection system of gas engine is built. Simulation software Matlab/Simulink are employed to analyze the impact which the voltage, number of the coil turns and air gap width may produce to the open and close characteristics of the solenoid valve. The ideal response characteristics are got through the calculation. An optimal scheme which satisfies the operation requirements is put forward.

3)Laser Wakefield plasma acceleration of electrons to energies above 10 GeV, may be possible in the new high power Laser beam facilities. The design of an Electron Spectrometer with an electro-magnet with adjustable magnetic field is proposed for the characterization of electron energy spectrum with a precision better than 10% for the entire energy range from 0.5 GeV to 38 GeV. The expected precision in the measurement of the electron energy is calculated as a function of the magnetic field, of the electron energy and of the magnet length. To outline the advantages offered by a pulsed electromagnet with high magnetic fields, the mass and the electric power lost in the coils of a 4 m long electromagnet with continuous current and Iron yoke are calculated.

4) As a result of investigating analytically and experimentally the interchangeability between thermal, electrical and magnetic energies, it is proved in the presented study that the electric and magnetic energies have an equivalent grade and nature as the thermal energy. So, the natural flow of electric charges and magnetic flux is associated also by increase of entropy of universe, similar to the heat, and has the same nature of waves as the electromagnetic heat radiation. Such results lead to modify exclusively the definition of the physical nature of the electric charge and magnetic flux which is unavailable in literature.

5) This article discusses the use of a toroidal coil in measuring alternating current from a straight current-carrying wire passing perpendicularly through the coil. The sinusoidally oscillating current generates a sinusoidally oscillating magnetic field in its vicinity. This, in turn, induces a sinusoidally oscillating emf in the toroid. This (measured) emf can be used in order to calculate the magnitude of the electric current in the wire. The study was done by deriving a single analytical formula for finding out the calculated current with the wire passing through any given point inside the toroid.

***INTRODUCTION:***

***HISTORY:***

Originally, electricity and magnetism were considered to be two separate forces. This view changed, however, with the publication of James Clerk Maxwell's 1873 A Treatise on Electricity and Magnetism in which the interactions of positive and negative charges were shown to be mediated by one force.

Later, Christian Orsted was setting up his materials; he noticed a compass needle deflected away from magnetic north when the electric current from the battery he was using was switched on and off. This deflection convinced him that magnetic fields radiate from all sides of a wire carrying an electric current, just as light and heat do, and that it confirmed a direct relationship between electricity and magnetism. Orsted was not able to explain this phenomenon at that time but this led to intense research in the scientific community. Hence, these concepts are now studied under the field of electromagnetism.

***DEFINITION:***

Electromagnetism is a branch of physics involving the study of the electromagnetic force, a type of physical interaction that occurs between electrically charged particles. The electromagnetic force usually exhibits electromagnetic fields such as electric fields, magnetic fields, and light and is one of the four fundamental interactions (commonly called forces) in nature.

***APPLICATIONS:***

1) the most dominant use of power in homes as well as commercial buildings is lighting systems. These lighting systems used numerous fluorescent lighting fixtures. Ballasts used in the fluorescent lamps use electromagnetism principle so that at the time of turn ON of the light it produces high voltage.

2) Security systems use locking systems for doors which are generally magnetic locking systems. These systems are unlocked either by a magnetic card swiping or having a security code.

3) Various sensors and actuating devices work on the bases of electromagnetism. Electromagnetic sensors include Hall-effect sensors, magneto resistive sensors, fluxgate sensors, etc. These sensors convert the physical quantity such as flow, pressure, level, proximity, etc into an electrical signal.

4) Maglev is the modern technology of transportation systems that use the concept of electromagnetism. These are called as high speed trains which use powerful electromagnets to develop the speed. These trains will float over a guide way using the basic principles of magnets such as electromagnetic suspension (EMS) and electrodynamic suspension (EDS). In EMS, electromagnets employed on the train body are attracted to the iron rails.

***OLD RESEARCH PAPER ON MAGNETIC LEVITATION TRAIN:***

Superconducting magnets, created by cooling electromagnets to low temperatures, can reduce power consumption and cost of the magnetic levitation trains. A combination of superconducting magnets and a fusion of electromagnetic suspension (EMS) and electrodynamic suspension (EDS) technology can both reduce cost and provide stability between magnetic forces.

***RESULTS AND DISCUSSION:***

Superconducting Magnets can reduce the amount of power consumed and associated cost, the electromagnets used for lift and propulsion of the train can be replaced with electromagnets cooled to low temperatures, making them superconducting magnets. If electromagnets are cooled to low temperatures, electrical resistance disappears almost entirely, which reduces power consumption considerably. Because electrical resistance is decreased with the use of superconducting magnets, the installation of such an electromagnet could reduce Old Dominion’s Maglev expenditures.

***CONCLUSION:***

The problem of Old Dominion University’s Maglev train’s power consumption, due to levitation and overcoming air resistance, can be solved with the use of superconducting magnets. These cryogenically cooled magnets support a very high current density with a vanishingly small resistance. This characteristic permits magnets to be constructed that generate intense magnetic fields with little or no electrical power input, thus reducing operational cost as well. Furthermore, the superconducting magnets could be placed on the bogie underneath the train, effectively combining electromagnetic suspension and electrodynamic suspension technology to overcome stability issues between the magnetic forces encountered when testing and operating the train.

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