विज्ञान एवं प्रावैधिकी विभाग
Department of Science and Technology
Government of Bihar

MUZAFFARPUR INSTITUTE OF TECHNOLOGY, MUZAFFARPUR

COURSE FILE
OF
PHYSICS
(L-T-P:3-0-3)

By:

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ASSISTANT PROFESSOR,

DEPARTMENT OF PHYSICS

MIT, MUZAFFARPUR

CONTENTS

Govt. of Bihar

MUZAFFARPUR INSTITUTE OF TECHNOLOGY,
MUZAFFARPUR-842003

(Under the Department of Science & Technology Govt. of Bihar, Patna)

Department of Physics

Vision:

- To serve the nation by providing practical and theoretical knowledge to the students in the field of engineering and experimental research.

Mission :

- To make the laboratory well equipped.
- To arrange new experiment in lab as per syllabus.
- To encourage innovative work to students by undertaking projects, collaboration with industries, institution, and government.

Engineering Physics Educational Objectives (PEO)

After one years of graduation a BE graduate would be able to

- Plan, design, construct, maintain, analyze, advance, and manage engineering projects of moderate complexity
- Pursue professional licensure and certifications
- Engage in life-long learning and pursue advanced level studies
- Demonstrate leadership skills through career advancement and active participation in the all engineering profession and in the community

Engineering Physics Student Outcomes (PO)

Students who complete the B.E. degree in different discipline will be able to:

1) An ability to apply knowledge of Physics in their specific branches
2) The ability to conduct laboratory experiments and to critically analyze and interpret experimental data
3) The ability to perform the design of different model by means of design experiences integrated throughout the professional component of the curriculum,
4) An ability to function on teams, that must integrate contributions from different areas of physics towards the solution of multi-disciplinary projects.
5) An ability to identify, formulate, and solve Electromagnetic problems in Electrical engineering.
6) An ability to write and speak effectively,
7) The broad education necessary to understand the impact of engineering Physics solutions in a global and societal context,
8) A recognition of the need for, and an ability to engage in life-long learning,
9) An ability to use the techniques, skills, and modern tools necessary for Physics engineering practice
10) Possess a thorough understanding of techniques that are appropriate to administer and evaluate construction contracts, documents and codes
11) Possess ability to estimate costs, estimate quantities and evaluate materials for construction purposes

Course Description

Engineering physics or engineering science refers to the study of the combined disciplines of physics, mathematics and engineering, particularly computer, nuclear, electrical, electronic, materials or mechanical engineering. By focusing on the scientific method as a rigorous basis, it seeks ways to apply, design, and develop new solutions in Unlike traditional engineering disciplines, engineering science/physics is not necessarily confined to a particular branch of science, engineering or physics. Instead, engineering science/physics is meant to provide a more thorough grounding in applied physics for a selected specialty such as optics, quantum physics, materials science, applied mechanics, electronics, nanotechnology, microfabrication, microelectronics, photonics, mechanical engineering, electrical engineering, nuclear engineering, biophysics, control theory, aerodynamics, energy, solid-state physics, etc. It is the discipline

devoted to creating and optimizing engineering solutions through enhanced understanding and integrated application of mathematical, scientific, statistical, and engineering principles. The discipline is also meant for cross-functionality and bridges the gap between theoretical science and practical engineering with emphasis in research and development, design, and analysis.

Course Objectives

1. Creating an environment to make teaching more learning centric rather than curriculum centric.
To train students in basic science.
3. To develop industry institute interface for collaborative research, internship and fellowship for PG Programme.
4. To focus undergraduate engineering students on the application of established methods to the design and analyze of engineering solutions.

Theory Course Outcomes: (Branch: Civil, IT, EC, EL, ME & IT)

Course Outcome 1: Working knowledge of fundamental physics and basic engineering principles to include advanced knowledge in one or more engineering disciplines
Course Outcome 2: The ability to formulate, conduct, analyzes, and interprets experiments in engineering physics.
Course Outcome 3: To understand and to compute problems in Quantum Physics
Course Outcome 4: Use modern engineering physics techniques and tools.
Course Outcome 5: To enhance knowledge in optoelectronics, Light and Mechanics.

Programm Outcomes:[Physics]

Programm Outcome 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
Programm Outcome 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
Programm Outcome 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
Programm Outcome 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
Programm Outcome 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Programm Outcome 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
Programm Outcome 7: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
Programm Outcome 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
Programm Outcome 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
Programm Outcome 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
Programm Outcome 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
Programm Outcome 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping – CO – PO :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO2	2	3	-	1	-	-	-	-	1	1	1	1
CO2	3	2	1	2	-	-	-	-	2	1	-	1
CO3	2	2	-	3	-	-	-	-	1	1	-	-2
CO4	2	3	-	2	1	1	-	-	1	1	-	2
CO5	3	2	2	3	-	1	1	-	1	2	-	2

3 – Excellent; 2 – Good; 1 – Average

Lab Course Outcomes: [101101P, 102101P, 105101P, 103201P]

Course Outcome 1: Experimental knowledge of fundamental physics and basic engineering principles to include advanced knowledge in one or more engineering disciplines

Course Outcome 2: To design different experimental setup in the field of Optics, Laser, Semiconductor Physics, & Quantum Physics.
Course Outcome 3: The ability to formulate experimental design analyzes, and interprets experiments in engineering physics.
Course Outcome 4: Use of modern engineering devices in Physics experimental work.
Course Outcome 5: To enhance experimental knowledge in optoelectronics, Light and Mechanics.

Programm Outcomes: [Physics]

Programm Outcome 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
Programm Outcome 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
Programm Outcome 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
Programm Outcome 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
Programm Outcome 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
Programm Outcome 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
Programm Outcome 7: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
Programm Outcome 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
Programm Outcome 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
Programm Outcome 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and

design documentation, make effective presentations, and give and receive clear instructions.
Programm Outcome 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
Programm Outcome 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping – CO – PO :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO2	2	2	-	1	-	-	-	-	1	1	1	1
CO2	2	2	1	2	-	-	-	-	2	1	-	1
CO3	2	2	-	3	-	-	-	-	1	1	-	-2
CO4	2	2	-	3	1	1	-	-	1	1	-	2
CO5	3	2	2	3	-	1	1	-	1	2	-	2

3 – Excellent; 2 – Good; 1 – Average

B. TECH. SEMESTER (PHYSICS SYLLABUS)

CIVIL Engineering: MECHANICS

PRE-REQUISITES: HIGH-SCHOOL EDUCATION

MODULE 1: VECTOR MECHANICS OF PARTICLES (20 LECTURES)

Transformation Of Scalars And Vectors Under Rotation Transformation; Forces In Nature; Newton's Laws And Its Completeness In Describing Particle Motion; Form Invariance Of Newton's Second Law; Solving Newton's Equations Of Motion In Polar Coordinates; Problems Including Constraints And Friction; Extension To Cylindrical And Spherical Coordinates; Potential Energy Function; F = - Grad V, Equipotential Surfaces And Meaning Of Gradient; Conservative And Non-Conservative Forces, Curl Of A Force Field; Central Forces; Conservation Of Angular Momentum; Energy Equation And Energy Diagrams; Elliptical, Parabolic And Hyperbolic Orbits; Kepler Problem; Application: Satellite Manoeuvres; Noninertial Frames Of Reference; Rotating Coordinate System: Five-Term Acceleration Formula. Centripetal AndCoriolis Accelerations; Applications: Weather Systems, Foucault Pendulum; Harmonic Oscillator; Damped Harmonic Motion – Over-Damped, Critically Damped And Lightly-Damped Oscillators; Forced Oscillations And Resonance.

MODULE 2: PLANAR RIGID BODY MECHANICS (10 LECTURES)

Definition And Motion Of A Rigid Body In The Plane; Rotation In The Plane; Kinematics In A Coordinate System Rotating And Translating In The Plane; Angular Momentum About A Point Of A Rigid Body In Planar Motion; Euler's Laws Of Motion, Their Independence From Newton's Laws, And Their Necessity In Describing Rigid Body Motion; Examples. Introduction To Three-Dimensional Rigid Body Motion — Only Need To Highlight The Distinction From Two-Dimensional Motion In Terms Of (A) Angular Velocity Vector, And Its Rate Of Change And (B) Moment Of Inertia Tensor; Three-Dimensional Motion Of A Rigid Body Wherein All Points Move In A Coplanar Manner: E.G. Rod Executing Conical Motion Withcenter Of Mass Fixed — Only Need To Show That This Motion Looks Two-Dimensional But Is Threedimensional, And Two-Dimensional Formulation Fails.

MODULE 3: STATICS (10 LECTURES)

Free Body Diagrams With Examples On Modelling Of Typical Supports And Joints; Condition For Equilibrium In Three- And Two- Dimensions; Friction: Limiting And Non-Limiting Cases; Forcedisplacement Relationship; Geometric Compatibility For Small Deformations; Illustrations Through Simple Problems On Axially Loaded Members Like Trusses.

MODULE 4: MECHANICS OF SOLIDS (30 LECTURES)

Concept Of Stress At A Point; Planet Stress: Transformation Of Stresses At A Point, Principal Stresses And Mohr's Circle; Displacement Field; Concept Of Strain At A Point; Plane Strain: Transformation Of Strain At A Point, Principal Strains And Mohr's Circle; Strain Roseoe; Discussion Of Experimental Results On One- Dimensional Material Behaviour; Concepts Of

Elasticity, Plasticity, Strain Hardening, Failure (Fracture / Yielding); Idealization Of Onedimensional Stress-Strain Curve; Generalized Hooke's Law With And Without Thermal Strains For Isotropic Materials; Complete Equations Of Elasticity; Force Analysis — Axial Force, Shear Force, Bending Moment And Twisting Moment Diagrams Of Slender Members (Without Using Singularity Functions); Torsion Of Circular Shafts And Thin-Walled Tubes (Plastic Analysis And Rectangular Shafts Not To Be Discussed); Moment Curvature Relationship For Pure Bending Of Beams With Symmetric Cross-Section; Bending Stress; Shear Stress; Cases Of Combined Stresses; Concept Of Strain Energy; Yield Criteria; Deflection Due To Bending; Integration Of The Moment-Curvature Relationship For Simple Boundary Conditions; Method Of Superposition (Without Using Singularity Functions); Strain Energy And Complementary Strain Energy For Simple Structural Elements (I.E. Those Under Axial Load, Shear Force, Bending Moment And Torsion); Castigliano's Theorems For Deflection Analysis And Indeterminate Problems.

Reference Books:

1.An Introduction To The Mechanics Of Solids, 2nd Ed. With Si Units — Sh Crandall, Nc Dahl &Tj Lardner
2.Engineering Mechanics: Statics, 7th Ed. — Jl Meriam
3. Engineering Mechanics Of Solids — EpPopov Laboratory
4. Coupled Oscillators; Experiments On An Air-Track
5. Experiment On Moment Of Inertia Measurement
6. Experiments With Gyroscope; Resonance Phenomena In Mechanical Oscillators.

For Mechanical Engineering:

Module 1: Electrostatics In Vacuum (8 Lectures)

Calculation Of Electric Field And Electrostatic Potential For A Charge Distribution; Divergence And Curl Of Electrostatic Field; Laplace's And Poisson's Equations For Electrostatic Potential And Uniqueness Of Their Solution And Connection With Steady State Diffusion And Thermal Conduction; Practical Examples Like Farady's Cage And Coffee-Ring Effect; Boundary Conditions Of Electric Field And Electrostatic Potential; Method Of Images; Energy Of A Charge Distribution And Its Expression In Terms Of Electric Field.

Module 2: Electrostatics In A Linear Dielectric Medium (4 Lectures)

Electrostatic Field And Potential Of A Dipole. Bound Charges Due To Electric Polarization; Electric Displacement; Boundary Conditions On Displacement; Solving Simple Electrostatics Problems In Presence Of Dielectrics – Point Charge At The Centre Of A Dielectric Sphere, Charge In Front Of A Dielectric Slab, Dielectric Slab And Dielectric Sphere In Uniform Electric Field.

Module 3: Magnetostatics (6 Lectures)

Bio-Savart Law, Divergence And Curl Of Static Magnetic Field; Vector Potential And Calculating It For A Given Magnetic Field Using Stokes' Theorem; The Equation For The Vector Potential And Its Solution For Given Current Densities.

Module 4: MagnetostaticsIn A Linear Magnetic Medium (3 Lectures)

Magnetization And Associated Bound Currents; Auxiliary Magnetic Field; Boundary Conditions On And. Solving For Magnetic Field Due To Simple Magnets Like A Bar Magnet; Magnetic Susceptibility And Ferromagnetic, Paramagnetic And Diamagnetic Materials; Qualitative Discussion Of Magnetic Field In Presence Of Magnetic Materials.

Module 5: Faraday's Law (4 Lectures)

Faraday's Law In Terms Of Emf Produced By Changing Magnetic Flux; Equivalence Of Faraday's Law And Motional Emf; Lenz's Law; Electromagnetic Breaking And Its Applications; Differential Form Of Faraday's Law Expressing

Curl Of Electric Field In Terms Of Time-Derivative Of Magnetic Field And Calculating Electric Field Due To Changing Magnetic Fields In Quasi-Static Approximation; Energy Stored In A Magnetic Field.

Module 6: Displacement Current, Magnetic Field Due To Time-Dependent Electric Field And Maxwell's Equations (5 Lectures)

Continuity Equation For Current Densities; Modifying Equation For The Curl Of Magnetic Field To Satisfy Continuity Equation; Displace Current And Magnetic Field Arising From Time-Dependent Electric Field; Calculating Magnetic Field Due To Changing Electric Fields In Quasi-Static Approximation. Maxwell's Equation In Vacuum And Non-Conducting Medium; Energy In An Electromagnetic Field; Flow Of Energy And Poynting Vector With Examples. Qualitative Discussion Of Momentum In Electromagnetic Fields.

Module 7: Electromagnetic Waves (8 Lectures)

The Wave Equation; Plane Electromagnetic Waves In Vacuum, Their Transverse Nature And Polarization; Relation Between Electric And Magnetic Fields Of An Electromagnetic Wave; Energy Carried By Electromagnetic Waves And Examples. Momentum Carried By Electromagnetic Waves And Resultant Pressure. Reflection And Transmission Of Electromagnetic Waves From A Non-Conducting Medium-Vacuum Interface For Normal Incidence.

Suggested Text Books

1. David Griffiths, Introduction To Electrodynamics
Suggested Reference Books:
2. HallidayAndResnick, Physics
3. W. Saslow, Electricity, Magnetism And Light

For Information Technology:

Module 1: Review Of Semiconductor Physics (10 Lectures)
E-K Diagram, Density Of States, Occupation Probability, Fermi Level And Quasi-Fermi Level (Variation By Carrier Concentration And Temperature); P-N Junction, Metal-Semiconductor Junction (Ohmic And Schottky); Carrier Transport, Generation, And Recombination; Semiconductor Materials Of Interest For Optoelectronic Devices, Bandgap Modification, Heterostructures; Light- Semiconductor Interaction: Rates Of Optical Transitions, Joint Density Of States, Condition For Optical Amplification.
Module 2: Semiconductor Light Emitting Diodes (Leds) (6 Lectures)
Rate Equations For Carrier Density, Radiative And Non-Radiative Recombination Mechanisms In Semiconductors, Led: Device Structure, Materials, Characteristics, And Figures Of Merit.
Module 3: Semiconductor Lasers (8 Lectures)
Review Of Laser Physics; Rate Equations For Carrier- And Photon-Density, And Their Steady State Solutions, Laser Dynamics, Relaxation Oscillations, Input-Output Characteristics Of Lasers. Semiconductor Laser: Structure, Materials, Device Characteristics, And Figures Of Merit; Dfb, Dbr, And Verticalcavity Surface-Emitting Lasers (Vecsel), Tunable Semiconductor Lasers.
Module 4: Photodetectors (6 Lectures)
Types Of Semiconductor Photodetectors -P-N Junction, Pin, And Avalanche And Their Structure, Materials, Working Principle, And Characteristics, Noise Limits On Performance; Solar Cells.
Module 5: Low-Dimensional Optoelectronic Devices (6 Lectures)
Quantum-Well, -Wire, And -Dot Based Leds, Lasers, And Photodetectors.
Suggested Text/Reference Books
1. J. Singh, Semiconductor Optoelectronics: Physics And Technology, Mcgrawhill Inc. (1995).
2. B. E. A. Saleh And M. C. Teich, Fundamentals Of Photonics, John Wiley & Sons, || S. M. Sze, Semiconductor Devices: Physics And Technology, Wiley (2008).
3Yariv And P. Yeh, Photonics: Optical Electronics In Modern Communications, Oxford University Press, New York (2007).

Semiconductor Physics:

Prerequisite: “Introduction To Quantum Mechanics” Desirable
Module 1: Electronic Materials (8 Lectures)
Free Electron Theory, Density Of States And Energy Band Diagrams, Kronigpenny Model (To Introduce Origin Of Band Gap), Energy Bands In Solids, E-K Diagram, Direct And Indirect Bandgaps, Types Of Electronic Materials: Metals, Semiconductors, And Insulators, Density Of States, Occupation Probability, Fermi Level, Effective Mass, Phonons.
Module 2: Semiconductors (10 Lectures)
Intrinsic And Extrinsic Semiconductors, Dependence Of Fermi Level On Carrier-Concentration And Temperature (Equilibrium Carrier Statistics), Carrier Generation And Recombination, Carrier Transport: Diffusion And Drift, P-N Junction, Metal-Semiconductor Junction (Ohmic And Schottky), Semiconductor Materials Of Interest For Optoelectronic Devices.

Module 3: Light-Semiconductor Interaction (6 Lectures)

Optical Transitions In Bulk Semiconductors: Absorption, Spontaneous Emission, And Stimulated Emission; Joint Density Of States, Density Of States For Photons, Transition Rates (Fermi's Golden Rule), Optical Loss And Gain; Photovoltaic Effect, Exciton, Drude Model.

Module 4: Measurements (6 Lectures)

Four-Point Probe And Van Der Pauw Measurements For Carrier Density, Resistivity, And Hall Mobility; Hot-Point Probe Measurement, Capacitance-Voltage Measurements, Parameter Extraction From Diode I-V Characteristics, Dlts, Band Gap By Uv-Vis Spectroscopy, Absorption/Transmission.

Module 5: Engineered Semiconductor Materials (6 Lectures)

Density Of States In 2d, 1d And 0d (Qualitatively). Practical Examples Of Lowdimensional Systems Such As Quantum Wells, Wires, And Dots: Design, Fabrication, And Characterization Techniques. Heterojunctions And Associated Band-Diagrams

Suggested Text/Reference Books:

1. J. Singh, Semiconductor Optoelectronics: Physics And Technology, Mcgrawhill Inc. (1995).
2. B. E. A. Saleh And M. C. Teich, Fundamentals Of Photonics, John Wiley & Sons, Inc., (2007). S. M. Sze, Semiconductor Devices: Physics And Technology, Wiley (2008).
3. Yariv And P. Yeh, Photonics: Optical Electronics In Modern Communications, Oxford University Press, New York (2007).

PHYSICS ELECTRONICS & ELECTRICAL

(WAVES AND OPTICS, AND INTRODUCTION TO QUANTUM MECHANICS

Module 1: Waves (3 Lectures)

Mechanical And Electrical Simple Harmonic Oscillators, Damped Harmonic Oscillator, Forced Mechanical And Electrical Oscillators, Impedance, Steady State Motion Of Forced Damped Harmonic Oscillator

Module 2: Non-Dispersive Transverse And Longitudinal Waves (4 Lectures)

Transverse Wave On A String, The Wave Equation On A String, Harmonic Waves, Reflection And Transmission Of Waves At A Boundary, Impedance Matching, Standing Waves And Their Eigen Frequencies, Longitudinal Waves And The Wave Equation For Them, Acoustics Waves

Module 3: Light And Optics (3 Lectures)

Light As An Electromagnetic Wave And Fresnel Equations, Reflectance And Transmittance, Brewster's Angle, Total Internal Reflection, And Evanescent Wave. Mirrors And Lenses And Optical Instruments Based On Them

Module 4: Wave Optics (5 Lectures)

Huygens' Principle, Superposition Of Waves And Interference Of Light By Wavefront Splitting And Amplitude Splitting; Young's Double Slit Experiment, Newton's Rings, Michelson Interferometer, Mach Zehnder Interferometer. Farunhofer Diffraction From A Single Slit And A Circular Aperture, The Rayleigh Criterion For Limit Of Resolution And Its Application To Vision; Diffraction Gratings And Their Resolving Power

Module 5: Lasers (5 Lectures)

Einstein's Theory Of Matter Radiation Interaction And A And B Coefficients; Amplification Of Light By Population Inversion, Different Types Of Lasers: Gas Lasers (He-Ne, Co2), Solid-State Lasers (Ruby, Neodymium), Dye Lasers; Properties Of Laser Beams: Mono-Chromaticity

Module 6: Introduction To Quantum Mechanics (5 Lectures)

Wave Nature Of Particles, Time-Dependent And Time-Independent Schrodinger Equation For Wave Function, Born Interpretation, Probability Current, Expectation Values, Free-Particle Wave Function And Wave-Packets, Uncertainty

Module 7: Solution Of Wave Equation (6 Lectures)

Solution Of Stationary-State Schrodinger Equation For One Dimensional Problems–Particle In A Box, Particle In Attractive Delta-Function Potential, Square-Well Potential, Linear Harmonic Oscillator. Scattering From A Potential Barrier And Tunneling; Related Examples Like Alpha-Decay, Field-Ionization And Scanning Tunneling Microscope, Tunneling In Semiconductor Structures. Threedimensional Problems: Particle In Three Dimensional Box And Related Examples.

Module 8: Introduction To Solids And Semiconductors (9 Lectures)

Free Electron Theory Of Metals, Fermi Level, Density Of States In 1, 2 And 3 Dimensions, Bloch's Theorem For Particles In A Periodic Potential, Kronigpenney Model And Origin Of Energy Bands.

Types Of Electronic Materials: Metals, Semiconductors, And Insulators. Intrinsic And Extrinsic Semiconductors, Dependence Of Fermi Level On Carrierconcentration And Temperature (Equilibrium Carrier Statistics), Carrier Generation And Recombination, Carrier Transport: Diffusion And Drift, P -N Junction.

Text / References:

1. G. Main, "Vibrations And Waves In Physics", Cambridge University Press, 1993.
2. H. J. Pain, "The Physics Of Vibrations And Waves", Wiley, 2006.
3. E. Hecht, "Optics", Pearson Education, 2008.
4. A. Ghatak, "Optics", Mcgraw Hill Education, 2012.
5. O. Svelto, "Principles Of Lasers", Springer Science & Business Media, 2010.
6. D. J. Griffiths, "Quantum Mechanics", Pearson Education, 2014.
7. R. Robinett, "Quantum Mechanics", Oup Oxford, 2006.
8. D. Mcquarrie, "Uantum Chemistry", University Science Books, 2007.
9. D. A. Neamen, "Semiconductor Physics And Devices", Times Mirror High

GATE SYLLABUS

Physics Engineering

Section 1: Mathematical Physics

Linear vector space: basis, orthogonality and completeness; matrices; vector calculus; linear differential equations; elements of complex analysis: Cauchy-Riemann conditions, Cauchy's theorems, singularities, residue theorem and applications; Laplace transforms, Fourier analysis; elementary ideas about tensors: covariant and contravariant tensor, Levi-Civita and Christoffel symbols.

Section 2: Classical Mechanics

D'Alembert's principle, cyclic coordinates, variational principle, Lagrange's equation of motion, central force and scattering problems, rigid body motion; small oscillations, Hamilton's formalisms; Poisson bracket; special theory of relativity: Lorentz transformations, relativistic kinematics, mass-energy equivalence.

Section 3: Electromagnetic Theory

Solutions of electrostatic and magnetostatic problems including boundary value problems; dielectrics and conductors; Maxwell's equations; scalar and vector potentials; Coulomb and Lorentz gauges; Electromagnetic waves and their reflection, refraction, interference, diffraction and polarization; Poynting vector, Poynting theorem, energy and momentum of electromagnetic waves; radiation from a moving charge.

Section 4: Quantum Mechanics

Postulates of quantum mechanics; uncertainty principle; Schrodinger equation; one-, two- and three-dimensional potential problems; particle in a box, transmission through one dimensional potential barriers, harmonic oscillator, hydrogen atom; linear vectors and operators in Hilbert space; angular momentum and spin; addition of angular momenta; time independent perturbation theory; elementary scattering theory.

Section 5: Thermodynamics and Statistical Physics

Laws of thermodynamics; macrostates and microstates; phase space; ensembles; partition function, free energy, calculation of thermodynamic quantities; classical and quantum statistics; degenerate Fermi gas; black body radiation and Planck's distribution law; Bose-Einstein condensation; first and second order phase transitions, phase equilibria, critical point.

Section 6: Atomic and Molecular Physics

Spectra of one- and many-electron atoms; LS and jj coupling; hyperfine structure; Zeeman and Stark effects; electric dipole transitions and selection rules; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Franck-Condon principle; Raman effect; NMR, ESR, X-ray spectra; lasers: Einstein coefficients, population inversion, two and three level systems.

Section 7: Solid State Physics & Electronics

Elements of crystallography; diffraction methods for structure determination; bonding in solids; lattice vibrations and thermal properties of solids; free electron theory; band theory of solids:

nearly free electron and tight binding models; metals, semiconductors and insulators; conductivity, mobility and effective mass; optical,ielectric and magnetic properties of solids; elements of superconductivity: Type-I and Type II superconductors, Meissner effect, London equation.

Semiconductor devices: diodes, Bipolar Junction Transistors, Field Effect Transistors; operational amplifiers: negative feedback circuits, active filters and oscillators; regulated power supplies; basic digital logic circuits, sequential circuits, flip-flops, counters, registers, A/D and D/A conversion.

Section 8: Nuclear and Particle Physics

Nuclear radii and charge distributions, nuclear binding energy, Electric and magnetic moments; nuclear models, liquid drop model: semi-empirical mass formula, Fermi gas model of nucleus, nuclear shell model; nuclear force and two nucleon problem; alpha decay, beta-decay, electromagnetic transitions in nuclei; Rutherford scattering, nuclear reactions, conservation laws; fission and fusion; particle accelerators and detectors; elementary particles, photons, baryons, mesons and leptons; quark model.

MUZAFFARPUR INSTITUTE OF TECHNOLOGY

B. Tech. 1st (First) Semester (2019 Batch) TIMETABLE WITH EFFECT FROM 11.10.2019

(Mechanical, Civil, Information Technology, Leather Technology MIT & Mech Engg and Civil Engg Samastipur)

DAY	Branch	I (09.00-10.00AM)	II (10.00-11.00AM)	III (11.00-12.00PM)	IV (12.00-01.00PM)		V (02.00-3.00PM)	VI (3.00-4.00PM)	VII (4.00-5.00PM)
MON	Mech. + LT & Mech. (SMP)	EGD (AKM)	EGD (AKM)	PHY (AD)	BEE (KKJ)	R			
	Civil-G1	BEE (NK)	PHY (SKT)	MATH –I (T) BEE (T) (NK)					
	IT	PHY (SKT)	MATH –I	EGD (SSP)	BEE (RSS)				
	Civil-G2	MATH-I	PHY	EGD(VJ)					
TUE	Mech. + LT & Mech. (SMP)	----------PHYSICS LAB (AD+SKT)----------			MATH-I	E	PHY (T) (SKT)		
		----------BEE LAB (KKJ)----------					----------EGD LAB (AKM) 53----------		
	Civil-G1	PHY (AD)	MATH-I	PHY (T) (SKT)			BEE (T) (NK)		
				----------BEE LAB (NK)----------			----------EGD LAB (JY) 50----------		
	IT		----------BEE LAB (RSS)----------			C	----------PHYSICS LAB (AD+SKT)----------		
			PHY (T) (SKT)	MATH-I (T)			----------EGD LAB (SSP) 48----------		
	Civil-G2	MATH –I (T) BEE (T)(NK)	BEE (NK)	PHY			EGD (VJ)	BEE (NK)	PHY (T)
WED	Mech. + LT & Mech. (SMP)	BEE (KKJ)	PHY (AD)	MATH-I	BEE (T) (KKJ) MATH (T)		PHY (T) (AD)		
						E	----------EGD LAB (AKM) 53----------		
	Civil-G1	EGD (JY)	MATH-I	BEE (NK)	PHY (T) (AD)				
	IT	PHY (AD)	----------BEE LAB (RSS)----------				----------PHYSICS LAB (AD+SKT)----------		
			PHY (T) (AD)				----------EGD LAB (SSP) 48----------		
	Civil-G2	BEE (NK)	MATH-I	PHY			MATH –I (T) BEE (T) (NK)		
THU	Mech. + LT & Mech. (SMP)	----------PHYSICS LAB (AD+SKT)----------			BEE(KKJ)	S			
		----------BEE LAB (KKJ)----------							
	Civil-G1	PHY(SKT)	MATH-I	PHY (T) (AD)			----------PHYSICS LAB (AD+SKT)----------		
							MATH –I (T)		
	IT		BEE (NK)	MATH –I	PHY(AD)		BEE (T) (RSS) MATH-I (T)		
	Civil-G2	BEE (NK)	MATH-I	PHY (T)			----------EGD LAB (VJ)(53)----------		
				----------BEE LAB(NK)----------		S	PHY(T)		
FRI	Mech. + LT & Mech. (SMP)	PHY (T) (SKT)	BEE (KKJ)	PHY (AD)			BEE (T) (KKJ) MATH (T)		
	Civil-G1	MATH –I (T) BEE (T) (NK)	MATH -I	BEE (KKJ)			----------PHYSICS LAB (AD+SKT)----------		
							----------EGD LAB (JY) 50----------		
	IT		PHY(SKT)	MATH-I	BEE (RSS)		BEE (T) (RSS)		
	Civil-G2	----------PHYSICS LAB ----------			PHY		----------EGD LAB (VJ) (48)----------		
			----------BEE LAB (NK)----------				MATH –I (T)		

SAT	Mech. + LT & Mech. (SMP)	MATH-I	PHY(SKT)	BEE (T) (KKJ) MATH (T))			
	Civil-G1		PHY (T) (AD)	EGD (JY)	BEE (NK)		
		----------BEE LAB (NK)--------					
	IT		MATH-I	EGD (SSP)	BEE (RSS)		
	Civil-G2	----------PHYSICS LAB ----------			MATH-I		
				BEE (T) (NK)			

Room No. for theory & tutorial classes: Mech. & LT & Mech (SMP: Samastipur) (IT-02), Civil-G1 (IT-07), IT(IT-06), Civil-G2 (IT-21).
Civil-G1-> Roll No. 1- 31 of MIT + Roll No. 1- 27 of Samastipur, Civil-G2-> Roll No. 32- 62 of MIT + Roll No. 28-54 of Samastipur.
Abbreviation of Subjests: EGD – Engineering Graphics & Design; BEE – Basic Electrical Engineering; PHY – Physics; T – Tutorial.
Abbreviation of Faculty Name: AKM – Arvind Kumar Madhesiya; SKT – Swatantra Kumar Tiwari; NK – Nayan Kumar; AD – Achyutesh Dixit; JY – Jigesh Yadav; RSS – Ram Sagar Singh, SSP – S S Prasad; VJ: Vinayak Jha; KKJ: Kumar Keshav Jha

Dr Nidhish Kumar Singh
In Charge 1st Year Timetable

MUZAFFARPUR INSTITUTE OF TECHNOLOGY

B.Tech. 2nd (Second) Semester (2019 Batch) TIME TABLE WITH EFFECT FROM 06.01.2020

(Electrical Engg. MIT, Electronics & Communication Engg.MIT, & Electrical Engg. Samastipur)

DAY	Branch	I (09-10.00AM)	II (10.00-11.00AM)	III (11.00-12.00PM)	IV (12.00-01.00PM)		V (02.00-3.00PM)	VI (3.00-4.00PM)	VII (4.00-5.00PM)
MON	ECE		EGD (SSP)	MATH II	PHY (SKT)		----------KYP Classes----------		
	EE-G1			PHY (AD)	MATH II		----------BEE Lab (GL &NK)--------		
							PHY (T)(SKT)		
	EE-G2			MATH II	BEE (GL)	R			
	EE G3		BEE (GL)	PHY (SKT)			----------EGD Lab (VJ) (53)----------		
							----------PHY Lab (AD & SKT)----------		
TUE	ECE		----------PHY Lab (AD & SKT)----------				----------KYP Classes----------		
			MATH II (T)						
	EE-G1		----------BEE Lab (GL &YNS)--------				----------EGD Lab (AKM) (53)----------		
			PHY (T)(AD)			E	----------PHY Lab (AD & SKT)----------		
	EE-G2		EGD (GL)	PHY (SKT)	MATH II (T) BEE (T) (GL)		PHY (T)(AD)		
							----------BEE Lab (GL & YNS)--------		
	EE G3		MATH II	PHY (T)(AD)	BEE (GL)				BEE (T) (GL) MATH II (T)
WED	ECE		MATH II (T)			C	----------KYP Classes----------		
			----------PHY Lab (AD & SKT)----------						
	EE-G1		EGD (AKM)	PHY (AD)	MATH II (T) BEE (T)(HCV)		----------EGD Lab (AKM) (53)----------		
							----------PHY Lab (AD & SKT)----------		
	EE-G2		----------BEE Lab (GL & SA)--------						
			PHY (T) (SKT)			E			
	EE G3			PHY (SKT)	BEE (GL)		----------BEE Lab (GL & KKJ)----------		
							PHY (T) (AD)		
THU	ECE		PHY (AD)	MATH II	BEE (RSS)		----------EGD Lab (SSP) (53)----------		
						S	----------BEE Lab (RSS &KKJ)----------		
	EE-G1		MATH II	BEE (GL)	MATH II (T) BEE (T)(GL)				
	EE-G2		BEE (GL)	MATH II	BEE (T) (GL)		----------EGD Lab (VJ) (53)----------		
						S	----------PHY Lab (AD & SKT)----------		
	EE G3		BEE (T) (GL) MATH II (T)	PHY (SKT)	MATH				
FRI	ECE			MATH II	BEE (RSS)		----------EGD Lab (SSP) (53)----------		
							----------BEE Lab (RSS &KKJ)--------		PHY (T) (AD)

								BEE (T) (RSS)
	EE-G1		PHY (T) (AD)	BEE (GL)	MATH II (T) BEE (T)(GL)			
	EE-G2		PHY (T) (SKT) MATH II (T)	MATH II	PHY (AD)		----------EGD Lab (VJ) (53)---------- ----------PHY Lab (AD & SKT)----------	

	EE G3		BEE (T)(GL) MATH II (T)	PHY (SKT)	EGD (GL)			

SAT	ECE		PHY (T) (AD) BEE (T) (GL)	PHY (SKT)	BEE (RSS)		----------KYP Classes----------	
	EE-G1			BEE (GL)	PHY (AD)			
	EE-G2			MATH II (T) BEE (T)(GL)	BEE (GL)			
	EE G3		----------EGD Lab (VJ) (53)----------				----------BEE Lab (GL & SA)--------	
			----------PHY Lab (AD & SKT)----------				PHY (T) (SKT)	

Room No. for theory classes: EE-G1 (IT-08), EE-G2 (IT-11), EEG3 (IT-22), ECE (IT-09),
EE-G1-> Roll No. 1- 20 of MIT + Roll No. 1- 35 of Samastipur, EE-G2-> Roll No. 21- 40 of MIT + Roll No. 36-70 of Samastipur; EE G3- Roll No. 41- 63 of MIT + Roll No. 71-101 of Samastipur

Abbreviation of Subjests: EGD – Engineering Graphics & Design; BEE – Basic Electrical Engineering; PHY – Physics; T – Tutorial.
Abbreviation of Faculty Name EGD: AKM – Arvind Kumar Madhesiya; SSP – S S Prasad; VJ: Vinayak Jha;
Abbreviation of Faculty Name Physics: SKT – Swatantra Kumar Tiwari; AD – Achyutesh Dixit;
Abbreviation of Faculty Name BEE: NK – Nayan Kumar; RSS – Ram Sagar Singh, KKJ: Kumar Keshav Jha, YNS- Y. N. Sharma; SA- Shahzad Ahsan; HCV- Hari Charan Verma; AKS: Ankit Kumar Singh

Dr Swatantra Kumar Tiwari
In Charge 1st Year Timetable

Dr Nidhish Kumar Singh
In Charge 1st Year Timetable

2018 ELECTRONICS STUDENTS:

S.No.	COLLEGE ROLL NO	NAME
1	18EC01	AAUSAF ALAM
2	18EC02	ABHISHEK KUMAR
3	18EC03	ABHISHEK KUMAR
4	18EC04	AMIT KUMAR
5	18EC05	AMIT RAJ
6	18EC06	ANISHA KUMARI
7	18EC07	ANKIT KUMAR PATHAK
8	18EC08	ANUPRIYA
9	18EC09	AYUSH ANAND
10	18EC10	DEEPAK KUMAR
11	18EC11	DEEPU KUMAR
12	18EC12	DHIRAJ KUMAR
13	18EC13	HEMA KUMARI
14	18EC14	HIMANSHU KUMAR
15	18EC15	JAMIL AKHTAR
16	18EC16	KUMARI SNEHA PRAKASH
17	18EC17	LALIT KUMAR BHARTI
18	18EC18	MD MOZAMMIL ANSARI
19	18EC19	NIKHIL KUMAR
20	18EC20	NILESH KUMAR
21	18EC21	PRIYAM PRAKASH
22	18EC22	PRIYANSHU KUMAR
23	18EC23	RAUSHAN KUMAR
24	18EC24	RAVIKANT HALCHAL
25	18EC25	RICHA KUMARI
26	18EC26	SAUMMYA SINGH
27	18EC27	SHALINI SAURAV
28	18EC29	SHRUTI KUMARI
29	18EC30	SHUBHAM KUMAR
30	18EC31	SHUBHAM SHARMA
31	18EC32	SUBHASH YADAV
32	18EC33	SUSHANT KUMAR
33	18EC34	VIVEK KUMAR DIVYANSH

34	18EC35	VIVEK KUMAR SINGH
35	18EC36	AKASH RAJ
36	18EC37	PRABHAT RANJAN
37	18EC38	PRAKASH KUMAR
38	18EC39	SWATI KUMARI

2017 ELECTRONICS STUDENTS:

S. No.	Roll No.	Name
1	16EC01	ANKIT KUMAR
2	16EC09	UTSARG RANJAN
3	16EC10	AGHAZ JUNAID
4	16EC11	VIVEK KUMAR SONU
5	16EC12	SUGANDHA KUMARI
6	16EC13	SHREYA ANAND
7	16EC14	MD ARSHADULLAH
8	16EC16	NEHA PRAVEEN
9	16EC17	VISHAL KUMAR
10	16EC20	RAKESH KUMAR
11	16EC23	RAJU KUMAR
12	16EC24	PREM PRAKASH MANGLAM
13	16EC25	MD REHAN
14	16EC26	SUBHAM RAJ
15	16EC29	SANSKRITI SHREE
16	16EC30	VIMLA BHARTI
17	16EC31	PUJA KUMARI
18	16EC32	PRASHANT KUMAR
19	16EC33	PRANAY MOHAN
20	16EC34	OM PRAKASH
21	16EC35	MD SARVAR ALI
22	16EC36	NIDHI
23	16EC37	HIMANSHU RAJ
24	16EC38	NITISH KUMAR
25	16EC39	ANMOL SHRIVASTAVA
26	16EC40	KUNDAN KUMAR
27	16EC41	SHIKHA PURNIMA
28	16EC42	AYUSHMAN KUMAR
29	16EC43	SHIMPI KUMARI

30	16EC44	DEEPAK KUMAR GUPTA
31	16EC45	RAHUL RANJAN KAPRI
32	16EC46	SAKET RANA
33	16EC47	KISHAN KUMAR
34	16EC48	SRISTI SNEHA
35	16EC49	SHIVANI
36	16EC50	MAMTA KUMARI
37	16EC51	RAJ KUMAR
38	16EC52	ABHIMANYU KUMAR
39	16EC53	BRISHNI KANT PATHAK
40	17(LE)EC01	SHRUTI RAJNANDANI
41	17(LE)EC02	RAGINI KUMARI
42	17(LE)EC03	AKASH RAJ
43	17(LE)EC04	ANIL KUMAR
44	17(LE)EC05	JAY PRAKASH
45	17(LE)EC06	RITUL KUMARI
46	17(LE)EC07	MANOJ KUMAR

2016 ELECTRONICS STUDENTS:

S. No.	Roll No.	Name
1	15EC01	ASHISH KUMAR JHA
2	15EC02	ABHISHEK KUMAR
3	15EC03	ASHWANI JYOTI
4	15EC04	PRIYANKA KUMARI
5	13EC05	RANJEET KUMAR
6	15EC06	SUMBUL AFREEN
7	15EC07	PINKIKUMARI
8	15EC08	SAURAV KUMAR
9	15EC09	ANAMIKA RAJ
10	15EC10	SWEETY KUMARI CHAUDHARY
11	15EC11	ROHIT KUMAR
12	15EC12	RAUSHAN KUMAR
13	15EC13	ANOOP PATEL
14	15EC17	PUSHPAM BHARTI
15	15EC18	KARUNA KESHAR
16	15EC19	SATYAM KESHARI
17	15EC20	AMRITA KUMARI

18	15EC23	RANJAN KUMAR
19	15EC24	RAUSHAN KUMAR GUPTA
20	15EC25	UDAY SHANKAR KUMAR
21	15EC27	SHIVAM KUMAR
22	15EC28	AASHISH KARN
23	15EC29	HIMANSHU KUMAR
24	15EC30	CHANDA KUMARI
23	15EC32	VIKRAM KUMAR
26	15EC35	SUJEET KUMAR PANDIT
27	15EC36	RAVI PRATAP
28	15EC37	ABHIJEET ARYAN
29	15EC38	MD ISLAM
30	15EC39	RAHUL RAJ
31	15EC40	DEEPAK KUMAR
32	15EC41	SNEHI KUMARI
33	15EC42	AMIT KUMAR
34	15EC46	VIJETA
35	15EC47	HASMAIN KASHMI
36	16(LE)EC01	BAISHALI CHOUDHARY
37	16(LE)EC02	CHIRANJEEV KUMAR GUPTA

2018 ELECTRICAL STUDENTS:

S.No.	**COLLEGE ROLL NO**	**NAME**
1	18E01	ABHINAV KUMAR
2	18E02	ABHISHEK RAJ AMAN
3	18E03	ADITYA ARYAN
4	18E04	ADITYA KUMAR RAUSHAN
5	18E05	AJIT KUMAR
6	18E06	AKANKSHA KUMARI
7	18E07	AMARJEET KUMAR
8	18E08	ANKIT KUMAR
9	18E09	ANURAG
10	18E10	ANUSHKA KUMARI
11	18E11	ASHISH KUMAR SINHA
12	18E12	ATIBH VERMA
13	18E13	DEEPAK KUMAR
14	18E14	DHARNIDHAR KUMAR

15	18E15	DIVYA PRAKASH
16	18E16	GUDDU KUMAR BAHARDAR
17	18E17	HARSH ANAND
18	18E18	JITENDRA KUMAR SINHA
19	18E19	KM ARCHANA BANSAL
20	18E20	KOMAL DEEP
21	18E21	MAHIMA KUMARI
22	18E22	MANISH KUMAR
23	18E23	MANORANJAN
24	18E24	MAUSAM BHARATI
25	18E25	MAUSAM KUMARI
26	18E26	MAYUR SARMAN
27	18E27	MAZHAR IMAM
28	18E28	MD ASIF ALAM
29	18E29	MD QAMAR JAWAID
30	18E30	MD SAQLAIN MAZHAR
31	18E31	MD ZISHAN RAJA
32	18E32	NEERAJ KUMAR
33	18E33	PANKAJ KUMAR
34	18E34	PRABHU KUMAR
35	18E35	PRACHI KUMARI
36	18E36	PRAVEEN KUMAR
37	18E37	PRAVEEN KUMAR GAUTAM
38	18E38	PRIYA RAJ
39	18E39	PUNYA DEV KUMAR
40	18E40	RAHUL KUMAR
41	18E41	RAJARAM KUMAR
42	18E42	RAJEEV ANAND
43	18E43	RAKESH KUMAR
44	18E44	RAVI RANJAN KUMAR
45	18E45	RAVIRANJAN VARMA
46	18E46	RAVISHANKAR KUMAR SONU
47	18E47	RITURAJ KUMAR
48	18E48	SAKSHI PRIYA
49	18E49	SATYAM
50	18E50	SAURAV KUMAR

51	18E51	SAURAV KUMAR
52	18E52	SAURAV KUMAR
53	18E53	SHASHI RANJAN
54	18E54	SHIVAM KUMAR
55	18E55	SHUBHAM KUMAR
56	18E56	SONALI KUMARI
57	18E57	SUJEET KUMAR
58	18E58	SURAJ KUMAR RAJAK
59	18E59	SUSHIL KUMAR PATHAK
60	18E60	SUSHMA KUMARI
61	18E61	SWATI KUMARI
62	18E62	YASHWARDHAN
63	18E63	ARADHANA KUMARI
64	17E10	ABHIJEET
65	19(LE)01	ASHISH ARYAN
66	19(LE)02	NAVEEN KR. SINGH
67	19(LE)03	
68	19(LE)04	MANISH KUMAR
69	19(LE)05	ROHAN
70	19(LE)06	HANS RAJ KUMAR

2018 ELECTRICAL STUDENTS:

S.No.	**COLLEGE ROLL NO**	**NAME**
1	17/E01	SHIVANGI
2	17/E02	SAURAV SINGH
3	17/E03	SHIVAM DUBEY
4	17/E04	KANNU PRIYA
5	17/E05	SANIYA SINGH
6	17/E06	SAURAV KUMAR
7	17/E07	APARNA SINGH
8	17/E08	VIDYA KUMARI
9	17/E09	VIVEK KUMAR
10	17/E10	ABHIJIT KUMAR
11	17/E11	UTPAL KANT
12	17/E12	NIRAJ KUMAR

13	17/E13	KHOOSBU ANAND
14	17/E14	KANHAIYA KUMAR
15	17/E15	RAJ KAMAL
16	17/E16	SANDHYA KUMARI
17	17/E17	VANDANA BHARTI
18	17/E18	SATYA PRAKASH
19	17/E19	NEHA SINGH
20	17/E20	EHSANULLAH
21	17/E21	DEEPAK KUMAR
22	17/E22	ABHINAV KISHOR
23	17/E23	SINTU KUMAR
24	17/E24	PRAGYA KUMARI
25	17/E25	GAUTAM KUMAR
26	17/E26	ASHUTOSH KUMAR
27	17/E27	MEDHA
28	17/E28	KUMAR ARYAN
29	17/E29	SUMIT KUMAR
30	17/E30	MASOOD AHMAD
31	17/E31	VANISHA SHARMA
32	17/E32	NELSON RANI
33	17/E33	SANDEEP K. SINHA
34	17/E34	PAWAN KUMAR
35	17/E35	NAVIN PUSHKAR
36	17/E36	ANAMIKA BHARTI
37	17/E37	TAMANNA CHOUDHARY
38	17/E38	ABHISHEK RAJ
39	17/E39	PARVEEN KUMAR
40	17/E40	ANAMIKA KAUSHIK
41	17/E41	RAVISHANKAR KUMAR
42	17/E42	RAVI PRAKASH
43	17/E43	BUNTY KUMAR
44	17/E44	PRIYA KUMARI
45	17/E45	RAM BABU
46	17/E46	KUMAR ABHINEET
47	17/E47	VIKASH KUMAR
48	17/E48	ASHSH KUMAR
49	17/E49	MOHIT KUMAR
50	17/E50	AMAN RAJ
51	17/E51	ROHIT KUMAR

52	17/E52	PREM BHARTI
53	17/E53	MIYTHUN KUMAR
54	17/E54	SUSHIL KUMAR
55	17/E55	GHANSHYAM KUMAR
56	17/E56	ASHWINI KUMAR
57	17/E57	RAHAT ARAFAT
58	17/E58	MANISH KUMAR
59	17/E59	SANTOSH KUMAR
60	17/E60	ABHIMANYU SINGH
61	17/E61	SWETA KUMARI
62	17/E62	RAJ SHEKHAR
63	17/E63	NAVNEET NAYAN
64	17/E64	AMIT KUMAR
20	16/E47	SUBHAM KUMAR
66	16/E20	AMIT K. PANDIT
67	18LE01	ABHISKEK
68	18LE02	NITISH
69	18LE03	RAUSHAN
70	18LE04	P . RAJ
71	18LE05	MURARI
72	18LE06	MANISH KUMAR
73	18LE07	VISHAL KUMAR
74	18LE08	REYAZ
75	18LE09	MIRITYUNJAYA
76	18LE10	ADITYA SHANKAR
77	18LE11	S. KUMAR

2016 ELECTRICAL STUDENTS:

S.No.	COLLEGE ROLL NO	NAME
1	16/E01	NANDAN KUMAR
2	16/E02	ANJALI KUMARI
3	16/E03	KAUSTUBHA
4	16/E04	RISHABH KUMAR
5	16/E05	AMRITA KUMARI

6	16/E06	SUMIT KUMAR
7	16/E07	RITESH RAJ
8	16/E08	VIPUL MISHRA
9	16/E09	SAMEER KUMAR
10	16/E10	MD SAIFULLAH SADIQUE
11	16/E11	PREETI KUMARI
12	16/E12	KULDEEP THAKUR
13	16/E13	SHANTANU KUMAR SINGH
14	16/E14	SEEMA KUMARI
15	16/E15	PRIYAM KUMARI
16	16/E16	VANDANA BIHARI
17	16/E17	RAJNANDANI
18	16/E18	SANJAY KUMAR YADAV
19	16/E19	PRAVEEN DIVAKAR
20	16/E20	AMIT KUMAR PANDIT
21	16/E21	CHANDAN KUMAR THAKUR
22	16/E22	ALOK KUMAR
23	16/E23	DEVENDRA KUMAR
24	16/E24	ARVIND KUMAR
25	16/E25	AMITESH KUMAR
26	16/E26	VIVEK KUMAR
27	16/E27	VIKASH KUMAR RAY
28	16/E28	ROHIT KUMAR
29	16/E29	OM PRAKASH KUMAR
30	16/E30	RAVI KUMAR
31	16/E31	SANDEEP KUMAR
32	16/E32	DEO ALOK
33	16/E33	BAJRANGI KUMAR
34	16/E34	MANOJ KUMAR SONI
35	16/E35	SANJEEV KUMAR
36	16/E36	NEERAJ KUMAR
37	16/E37	SATYAM KUMAR
38	16/E38	PRASHANT GAURAV

39	16/E39	NITISH KUMAR RAJAK
40	16/E40	UJJAWAL KUMAR
41	16/E41	PRABHAT KUMAR
42	16/E42	MD HASIM JILANI
43	16/E43	SHIV CHARAN KUMAR
44	16/E44	ANISH BHARTI
45	16/E45	RAHUL KUMAR
46	16/E46	RAJEEV RANJAN PRASAD
47	16/E47	SHUBHAM KUMAR
48	16/E48	TAHIR QAMAR
49	16/E49	PRASHANT KUMAR
50	16/E50	NAMAN KUMAR
51	16/E51	KESHAV CHANDRA
52	16/E52	SWETA BHARTI
53	16/E53	PRATIK ANAND
54	16/E54	SHAGUFTA ANJUM
55	16/E55	GOLDEN KUMAR
56	16/E56	MURLI MANOHAR
57	16/E57	ARPIT ANAND
58	16/E58	AKSHAT RAJ
59	16/E59	ANJAN KUMAR
60	16/E60	SUMAN KUMAR BHARTIYA
61	16/E61	SAKET
62	16/E62	RISHABH KUMAR
63	16/E63	SUMAN KUMAR
64	16/E64	SUNITA KUMARI
65	16/E65	NISHANT RAJ
66	16/E66	VIPIN SINGH
67	16/E67	ANKIT RAJ
68	16/E68	GUNJAN KUMAR
69	16/E69	PRATAP CHANDRA CHOUDHARY
70	17/LE1	VIVEK KUMAR
71	17/LE2	RITIK KUMAR

72	17/LE3	ANAND RANJAN
73	17/LE4	ABHISHEK KUMAR
74	17/LE5	POONAM KUMARI
75	17/LE6	SAURABH KUMAR JHA
76	17/LE7	PARMANAND KUMAR
77	17/LE8	ROHAN RAJ
78	17/LE9	ANAND KUMAR
79	17/LE10	MANISH

2018 CIVIL STUDENTS:

SL. NO.	ROLL NO.	AKU REG. NO.	NAME
1	18C01	18101107011	ABHINANDAN KUMAR
2	18C02	18101107010	ABHISHEK KUMAR
3	18C03	18101107012	ABHISHEK KUMAR
4	18C04	18101107013	ABHISHEK KUMAR
5	18C05	18101107014	ABHISHEK KUMAR
6	18C06	18101107015	ADARSH KUMAR
7	18C07	18101107001	ADITI ARYA
8	18C08	18101107016	ADITYA KUMAR
9	18C09	18101107017	ADITYA KUMAR GAUTAM
10	18C10	18101107019	AKASH PRIYADARSHI
11	18C11	18101107018	ALOK KUMAR
12	18C12	18101107020	AMISHA
13	18C13	18101107021	ANAND KUMAR ANAND
14	18C16	18101107022	ASHUTOSH KUMAR
15	18C17	18101107023	ASHWINI KUMAR
16	18C18	18101107025	AVINASH KUMAR
17	18C19	18101107024	AYUSH ARYAN
18	18C20	18101107026	CHANDAN KUMAR
19	18C22	18101107027	DEVESH KUMAR GOIT
20	18C23	18101107028	DIVYA KUMARI
21	18C24	18101107029	GAUTAM KUMAR GUPTA

22	18C25	18101107030	KRISHNA KUMAR
23	18C26	18101107032	KUNDAN RAJ
24	18C27	18101107031	MD NASIR ALAM
25	18C28	18101107033	NILOTPAL KUMAR
26	18C29	18101107034	NISHANT RANJAN
27	18C30	18101107035	NITISH KUMAR
28	18C31	18101107036	PRASAD SHIVAM BIRKUMAR
29	18C32	18101107037	PRASHANT PRABHAKAR
30	18C33	18101107059	PRINCE KUMAR
31	18C34	18101107038	PRITAM RAJ
32	18C36	18101107039	RAHUL DEO
33	18C37	18101107040	RAHUL KUMAR
34	18C38	18101107041	RAJEEV KUMAR BHARTI
35	18C39	18101107042	RAJESH KUMAR SHARMA
36	18C40	18101107043	RAJU KUMAR
37	18C41	18101107044	RAMAN KUMAR SAURAV
38	18C42	18101107045	RITIKA
39	18C43	18101107046	ROHIT KUMAR
40	18C44	18101107047	ROHIT RAJ
41	18C45	18101107048	SANDIP KUMAR
42	18C46	18101107049	SHIVAM KUMAR
43	18C47	18101107050	SHREYA
44	18C48	18101107052	SHUBHAM RAJ ANAND
45	18C49	18101107051	SHWETA KASHYAP
46	18C50	18101107053	SHWETANK KUMAR
47	18C51	18101107054	SONU KUMAR RAJAK
48	18C52	18101107055	SUBHAY KUMAR
49	18C53	18101107056	SUDHIR KUMAR YADAV
50	18C54	18101107058	SUMIT SHEKHAR
51	18C56	18101107057	TUSHI KUMARI
52	18C57	18101107002	UTKARSH RAJ
53	18C58	18101107003	VIKASH KUMAR
54	18C59	18101107004	VINIT RAJ

55	18C60	18101107006	VISHAKHA BHARTI
56	18C62	18101107005	DHIRAJ KUMAR
57	18C63	18101107007	NAVEEN KUMAR
58	18C64	18101107008	PAPPU KUMAR
59	18C65	18101107009	VANDANA KUMARI

2017 CIVIL STUDENTS:

SL. NO.	ROLL NO.	AKU REG. NO.	NAME
1	17C01	17101107018	SONU KUMAR
2	17C02	17101107028	RAJNISH KUMAR
3	17C03	17101107002	GAURAV PANDEY
4	17C04	17101107016	MOHIT KUMAR
5	17C05	17101107005	PRASHANT KUMAR
6	17C06	17101107014	NATASHA
7	17C07	17101107062	ANIL KUMAR NAYAK
8	17C08	17101107006	NITESH KAPIL
9	17C09	17101107004	SAURAV KUMAR
10	17C10	17101107017	RAJRANJAN KUMAR
11	17C11	17101107001	SHUDHANSHU ROY
12	17C12	17101107011	DIVYANSHU SHEKHAR
13	17C13	17101107019	ARUN KUMAR SINGH
14	17C14	17101107010	ABHISHEK RAJ
15	17C15	17101107008	PREM PRAKASH
16	17C16	17101107012	JITENDRA KUMAR
17	17C17	17101107007	INDRAJEET KASHYAP
18	17C19	17101107003	DEEPAK KUMAR CHAUHAN
19	17C20	17101107013	SHREYA PATEL
20	17C21	17101107021	DHANANJAY KUMAR
21	17C22	17101107020	SHUBHAM BHARADWAJ
22	17C23	17101107009	SHIVAM JHA
23	17C24	17101107022	VIMAL BHASKAR
24	17C25	17101107015	BIRU KUMAR
25	17C26	17101107025	ADITYA KUMAR THAKUR

26	17C27	17101107026	RAVISH KUMAR
27	17C28	17101107023	RAHUL KUMAR
28	17C29	17101107033	KUNDAN KUMAR
29	17C30	17101107024	PRABHASH KUMAR
30	17C31	17101107047	GAURAV KUMAR
31	17C32	17101107029	VIKASH KUMAR
32	17C33	17101107060	MD FURQUAN ALI
33	17C34	17101107030	RANJAN SAH
34	17C35	17101107058	MD NAUMAN AKHTAR
35	17C36	17101107038	DEEPAK KUMAR
36	17C37	17101107041	NICKY KUMARI
37	17C38	17101107039	DEVESH KUMAR
38	17C39	17101107037	AJAY KUMAR
39	17C40	17101107053	CHANDRAMANI KUMAR
40	17C41	17101107042	AKRITI SINGH
41	17C42	17101107032	MOHIT KUMAR
42	17C43	17101107054	PRINCE MANI
43	17C44	17101107036	RUPAK KUMAR
44	17C45	17101107061	BINDA KUMAR
45	17C46	17101107034	ADITYA KUMAR
46	17C47	17101107031	VIKASH KUMAR
47	17C48	17101107035	SHASHI KUMAR
48	17C49	17101107049	ALOK RAJ
49	17C50	17101107051	MANJESH KUMAR
50	17C51	17101107045	UDAY RANJAN
51	17C52	17101107052	SONU KUMAR
52	17C53	17101107050	RAKESH KUMAR
53	17C54	17101107044	SHASHI RANJAN
54	17C55	17101107059	SHASHI RAJ
55	17C56	17101107048	RUPESH KAZI
56	17C57	17101107043	RAUSHAN KUMAR
57	17C58	17101107040	SANIYA SINGH
58	17C59	17101107046	NAVED HASAN

59	17C60	17101107027	RAGANI KUMARI
60	17C61	17101107056	DHIRAJ KUMAR
61	17C62	17101107057	SAMEER KUMAR
62	18LE(C)01	18101107901	ARYAN PRABHAT
63	18LE(C)02	18101107903	PRIYANSH KUMAR GOIT
64	18LE(C)03	18101107902	YASHWANT KUMAR
65	18LE(C)04	18101107904	ANAND KUMAR
66	18LE(C)07	18101107905	KAMAL NARAYAN SAH
67	18LE(C)08	18101107909	RITESH KUMAR LAL
68	18LE(C)09	18101107908	SAURAV ABHISHEK
69	18LE(C)10	18101107907	ATUL SRIVASTAVA
70	18LE(C)11	18101107910	ABHIJEET KUMAR
71	18LE(C)12	18101107911	ALOK KUMAR SINGH
72	16C54	16101107057	SHAHID PARWEZ

2016 CIVIL STUDENTS:

1	15C36	15101107030	SAURAV KUMAR SINGH
2	16C01	16101107053	MANI SHANKAR
3	16C02	16101107016	NAVNEET KUMAR NAYAN
4	16C03	16101107017	SWATI
5	16C05	16101107052	GHYANENDAR KUMAR
6	16C06	16101107006	SAURABH KUMAR
7	16C07	16101107026	SUMIT KUMAR GUPTA
8	16C08	16101107045	JAY PRAKASH KUMAR
9	16C09	16101107059	AAYUSH ANANT
10	16C10	16101107002	AKASHKUMAR
11	16C11	16101107036	PAWANKUMAR
12	16C12	16101107038	SHAMBHU KUMAR
13	16C13	16101107014	RICHA SINHA
14	16C14	16101107058	RAJEEV RANJAN
15	16C18	16101107050	RIYA KUMARI
16	16C19	16101107007	BIPIN BIHARI
17	16C21	16101107029	BIPIN KUMAR PATEL

18	16C22	16101107044	KAVIRANJAN KUMAR
19	16C23	16101107051	SONU KUMAR
20	16C24	16101107032	RUDRAPRATAP
21	16C25	16101107003	SHIVAM KUMAR SINGH
22	16C26	16101107039	RAUSHAN KUMAR
23	16C27	16101107023	VIVEKKUMAR
24	16C28	16101107055	MD QAMREALAM
25	16C30	16101107041	SONU RAJ
26	16C31	16101107001	RAJ KUMARPRASAD
27	16C32	16101107011	JYOTIKUMARI
28	16C33	16101107033	CHANDAN KUMAR
29	16C34	16101107048	DEEPAK KUMAR
30	16C35	16101107061	SONUKUMAR
31	16C36	16101107020	VIBHISHAN KUMAR
32	16C37	16101107018	AKHILESH KUMAR
33	16C38	16101107031	SUMITKUMAR
34	16C39	16101107027	RAUSHAN KUMAR
35	16C42	16101107046	DILIP KUMAR
36	16C43	16101107019	MANISH KUMAR
37	16C44	16101107037	RAHUL KUMAR MISHRA
38	16C45	16101107005	JAGAT NARAYAN
39	16C46	16101107022	YASHBINDRA KUMAR
40	16C47	16101107049	GOLDEN KUMAR
41	16C48	16101107015	ANKIT KUMAR
42	16C49	16101107012	AVINASH KUMAR
43	16C50	16101107010	ROHITKUMAR
44	16C51	16101107035	HITESHKUMARSAH
45	16C52	16101107060	ROSHAN KUMAR
46	16C53	16101107040	MANISH KUMAR
47	16C55	16101107043	PANKAJ KUMAR
48	16C56	16101107025	RAUSHAN KUMAR
49	16C57	16101107013	RAKESH KUMAR
50	16C58	16101107021	ASHISHKUMAR

51	16C59	16101107024	SANJEEV KUMAR
52	16C60	16101107030	SONU KUMAR
53	16C61	16101107056	ABHIJEET RAJ
54	16C62	16101107004	RISABH KUMAR
55	16C63	16101107009	SHASHISHEKHAR KUMAR
56	16C64	16101107008	SANDEEP KUMARGUDDU
57	16C65	16104107013	SHIKHA PURNIMA
58	17(LE)C01	17101107902	RATNESH PASWAN
59	17(LE)C02	17101107904	SHASHI KUMAR
60	17(LE)C03	17101107901	PANKAJ KUMAR
61	17(LE)C04	17101107905	SAROJ KUMAR
62	17(LE)C05	17101107903	RUPESH KUMAR
63	17(LE)C06	17101107906	PRABHAT RANJAN
64	17(LE)C07	17101107907	VISHNUKANT KUMAR
65	17(LE)C08	17101107909	HASHAN RAZA
66	17(LE)C10	17101107908	MD HASNAIN

2018 INFORMATION TECHNOLOGY STUDENTS:

S.No.	COLLEGE ROLL NO	NAME
1	18IT01	ABHISHEK KUMAR
2	18IT02	ABHISHEK KUMAR
3	18IT03	AMIN AKHTER
4	18IT04	ANIKET KUMAR SINHA
5	18IT05	ANJALI PRIYA
6	18IT06	ASTHA
7	18IT07	AYUSH KUMAR
8	18IT08	DILIP KUMAR
9	18IT09	GAURAV KUMAR
10	18IT10	JUHI KUMARI
11	18IT11	JYOTI KUMARI
12	18IT12	KAJAL SINGH
13	18IT13	KUMAR ABHISHEK
14	18IT14	MD IBRAHIM HUSSAIN
15	18IT15	MD SOHAIL
16	18IT16	NIKITA

17	18IT17	NIRAJ KUMAR
18	18IT18	PRIYANSHU KUMAR
19	18IT19	PRIYANSHU RAJ
20	18IT21	RAVI KUMAR
21	18IT22	RAVIRANJAN KUMAR
22	18IT24	SACHIN KUMAR
23	18IT25	SANDEEP KUMAR
24	18IT26	SHAAN ALI ARIFI
25	18IT27	SHASHI SHEKHAR
26	18IT28	SHEKHAR KUMAR SINHA
27	18IT29	SHRISTI SINGH
28	18IT30	SHUBHANGI SHREYA
29	18IT31	SUMIT PASWAN
30	18IT32	SURYAKANT VISHAL
31	18IT33	SUSHMITA
32	18IT34	UTTAM KUMAR
33	18IT35	VISHAL KUMAR
34	18IT36	VISHNU DARSHAN KUMAR
35	18IT37	ABHINAV KUMAR
36	18IT38	AMAN KUMAR
37	18IT39	GULSHAN MISHRA
38	18IT40	RAVI SHANKAR JHA

2017 INFORMATION TECHNOLOGY STUDENTS:

S. No.	URN	Roll No.	Name
1	16106107035	16IT07	RISHIKESH BHARDWAJ
2	16106107021	16IT15	BHANU KUMAR RANJAN
3	16106107038	16IT30	SUNIL KUMAR
4	17106107004	17IT01	ANKIT JHA
5	17106107005	17IT03	PREETI
6	17106107003	17IT04	PRATYASHA SHREE
7	17106107006	17IT05	SUDHAKAR PRAKASH
8	17106107012	17IT06	ABHISHEK KUMAR
9	17106107010	17IT07	RAHUL KUMAR SINHA
10	17106107009	17IT08	ALOK KUMAR
11	17106107015	17IT09	LUV
12	17106107008	17IT10	NITISH SHRIVASTAVA
13	17106107007	17IT12	RISHABH KUMAR

14	17106107001	17IT13	RIYA AGRAWAL
15	17106107002	17IT16	ANURAG PRAKASH
16	17106107013	17IT18	RITESH KUMAR
17	17106107020	17IT19	ESHA NANDINI
18	17106107028	17IT20	SURBHI KUMARI
19	17106107011	17IT21	APURVA SINGH
20	17106107022	17IT22	SHUBHAM KUMAR
21	17106107034	17IT23	NIVEDITA KUMARI
23	17106107019	17IT24	SHANTANU KUMAR
24	17106107014	17IT25	ANUPAM SINGH
25	17106107041	17IT26	VINEETA
25	17106107033	17IT27	MALA KUMARI
26	17106107023	17IT28	IFFAT NAAZ
27	17106107027	17IT29	NEESHA BHARTI
28	17106107042	17IT30	KUMAR SHIVAM
29	17106107017	17IT31	SHUBHAM KUMAR
30	17106107018	17IT32	ARVIND KUMAR
31	17106107024	17IT34	VIKASH KUMAR
32	17106107021	17IT35	ABHINAV KUMAR ANAND
33	17106107026	17IT36	MD OBAIDULLAH
34	17106107037	17IT37	MASUM RAJA
35	17106107016	17IT38	ANURAG GUPTA
36	17106107032	17IT39	RAHUL KUMAR JHA
37	17106107029	17IT40	SHUBHAM KUMAR
38	17106107025	17IT41	ANKIT KUMAR
39	17106107039	17IT42	ANURAG KUMAR SHARMA
40	17106107035	17IT43	JUHI KUMARI
41	17106107038	17IT44	ABHISHEK KUMAR
42	17106107040	17IT45	AKANKSHA ANAND
43	17106107030	17IT46	AMAN SHRAFF
44	17106107031	17IT47	RAKESH KUMAR PRASAD
45	17106107036	17IT48	NAVNEET KUMAR
46		17LE(IT)01	PRITY KUMARI
47		17LE(IT)02	ANJALI KUMARI
48		17LE(IT)03	SHALENDRA KUMAR
49		17LE(IT)04	PRINCE KUMAR
50		17LE(IT)05	MD. TAUFIK AHMAD
51		17LE(IT)06	SHUBHASH KUMAR
52		17LE(IT)07	PRINCE RAJ
53		17LE(IT)08	DEEPAK KUMAR

2018 ELECTRICAL ENGINEERING STUDENTS:

S.No.	COLLEGE ROLL NO	NAME

1	18E01	ABHINAV KUMAR
2	18E02	ABHISHEK RAJ AMAN
3	18E03	ADITYA ARYAN
4	18E04	ADITYA KUMAR RAUSHAN
5	18E05	AJIT KUMAR
6	18E06	AKANKSHA KUMARI
7	18E07	AMARJEET KUMAR
8	18E08	ANKIT KUMAR
9	18E09	ANURAG
10	18E10	ANUSHKA KUMARI
11	18E11	ASHISH KUMAR SINHA
12	18E12	ATIBH VERMA
13	18E13	DEEPAK KUMAR
14	18E14	DHARNIDHAR KUMAR
15	18E15	DIVYA PRAKASH
16	18E16	GUDDU KUMAR BAHARDAR
17	18E17	HARSH ANAND
18	18E18	JITENDRA KUMAR SINHA
19	18E19	KM ARCHANA BANSAL
20	18E20	KOMAL DEEP
21	18E21	MAHIMA KUMARI
22	18E22	MANISH KUMAR
23	18E23	MANORANJAN
24	18E24	MAUSAM BHARATI
25	18E25	MAUSAM KUMARI
26	18E26	MAYUR SARMAN
27	18E27	MAZHAR IMAM
28	18E28	MD ASIF ALAM
29	18E29	MD QAMAR JAWAID
30	18E30	MD SAQLAIN MAZHAR
31	18E31	MD ZISHAN RAJA
32	18E32	NEERAJ KUMAR
33	18E33	PANKAJ KUMAR
34	18E34	PRABHU KUMAR
35	18E35	PRACHI KUMARI
36	18E36	PRAVEEN KUMAR
37	18E37	PRAVEEN KUMAR GAUTAM
38	18E38	PRIYA RAJ
39	18E39	PUNYA DEV KUMAR

40	18E40	RAHUL KUMAR
41	18E41	RAJARAM KUMAR
42	18E42	RAJEEV ANAND
43	18E43	RAKESH KUMAR
44	18E44	RAVI RANJAN KUMAR
45	18E45	RAVIRANJAN VARMA
46	18E46	RAVISHANKAR KUMAR SONU
47	18E47	RITURAJ KUMAR
48	18E48	SAKSHI PRIYA
49	18E49	SATYAM
50	18E50	SAURAV KUMAR
51	18E51	SAURAV KUMAR
52	18E52	SAURAV KUMAR
53	18E53	SHASHI RANJAN
54	18E54	SHIVAM KUMAR
55	18E55	SHUBHAM KUMAR
56	18E56	SONALI KUMARI
57	18E57	SUJEET KUMAR
58	18E58	SURAJ KUMAR RAJAK
59	18E59	SUSHIL KUMAR PATHAK
60	18E60	SUSHMA KUMARI
61	18E61	SWATI KUMARI
62	18E62	YASHWARDHAN
63	18E63	ARADHANA KUMARI

Course Handout:

Institute / College Name :	MIT, Muzaffarpur		
Program Name	B. Tech 1st and 2nd Semester		
Course Code	101101, 102101, 105101, 103201, 105102		
Course Name	PH 1×01 PHYSICS-ME, CIVIL, IT, EL & EC		
Lecture / Tutorial (per week):	15/1	Course Credits	5.0
Course Coordinator Name	Dr. S.K. Tiwari, Dr. A. Dixit		

1. Scope and Objectives of the Course

This course is designed to understand fundamental concept of electromagnetic waves (EMW) propagating in different media. The aim of keeping this course is to develop capacity under student for different application of signal propagation in the different branches of engineering such as optical communication, networking and laser technology.The course is not limited only to EMT, but is extended in different other field of science and engineering for example polarization, optics and quantum physics.

2. The course outcomes are:

1. The course of quantum physics will provide understanding operator formalism,de Broglie hypothesis and various other things.

2. In optics students will learn interference, diffraction, and polarization, which are, vary basis in the field of signal propagation.

3. Textbooks

TB1: 'Introduction of Electromagnetic Theory' by D.J. Grifit, 3rdEditionPrentic Hall, New Jersey

4. Reference Books

RB1:'Optics, Ajay Ghatak,SatyaPrakashPublicatio, New Delhi

RB2: Engineering Physics-Hitendra K. Malik and Ajay Kumar Singh by TMH Publication.

Other readings and relevant websites:

S.No.	Link of Journals, Magazines, websites and Research Papers
1.	http://optics.byu.edu/BYUOpticsBook_2008.pdf
2.	http://qa.answers.com/Q/Difference_between_he-ne_laser_and_ruby_laser
3.	https://www.slideshare.net/Tuhin_Das/laser-its-application
4.	https://www.elprocus.com/laser-diode-construction-working-applications/

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Dr. A. Dixit & Dr S.K. Tiwari	
H.O.D	Dr. S.K. Jha	
Principal	Dr. J. N. Jha	
Date		

Evaluation and Examination Blue Print:

Internal assessment is done through quiz tests, presentations, assignments and project work. Two sets of question papers are asked from each faculty and out of these two, without the knowledge of faculty, one question paper is chosen for the concerned examination. Examination rules and regulations are uploaded on the student's portal. Evaluation is a very transparent process and the answer sheets of sessional tests, internal assessment assignments are returned back to the students.

The components of evaluations alongwith their weightage followed by the University is given below

Class test	5%
Assignments/Quiz Tests/Seminars	5%
Mid Semester	20%
End term examination	70%

Institute / School Name :	MIT, Muzaffarpur-842003		
Program Name	**B.Tech. EC & EL, ME, IT LT**		
Course Code	103201		
Course Name	Engineering Physics		
Lecture / Tutorial (per week):	3/1	**Course Credits**	3.5
Course Coordinator Name	A. Dixit		

2018-19 Lecture Plan:

Topics	**Lecture Number**	**Date on which the Lecture will be taken**
ELECTROSTATICS AND ELECTROMAGNETIC THEORY :		
Dielectrics - The three electric vectors, Gauss's law in Dielectrics, Energy stored in Electrostatic field, Boundary Conditions.	**1-2**	
Continuity Equation for charge, Displacement current, Maxwell's Equations in Differential and Integral form and their Physical significance	**3-4**	
Maxwell's Equations in free space and speed of plane electromagnetic waves travelling in vacuum.	**4-6**	
Poynting theorem and Poynting vectors, electromagnetic waves propagation in dielectrics and conductors.	**6-8**	
OPTICS &LASER :		
Temporal coherence Michelson's interferometer for measurement of coherence length of source and line width, Spatial coherence,	**9-10**	
Measurement of spatial coherence using young's Interferometer Fraunhofer diffraction by single slit, double slit and grating.Lasers and Laser light, Einstein A and B coefficient, Population inversion, Light amplification by optical resonator.	**11-12**	
Characteristics of Laser, Ruby laser, Working Principle of He-Ne Laser	**13-14**	
Unpolarised light, Production of plane polarised light by Polaroid technique (Principle of action should be emphasized) Brewster's Law,	**15-16**	
Malu's Law, Double Refraction, Production of Plane, Circular and elliptical, Polarized Light, Analysis of unpolarised light and polarized light,	**17-18**	
Magneto-optic effect, electro optic effect and photo elastic effect.	**19-20**	
QUANTUM PHYSICS :		

Planck's theory of black body radiation, Compton effect, Photo electric effect, Einstein photo electric equation and its experimental verification Wave particle duality,	**21-22**	
De-Broglie waves, De-Broglie wave velocity, Wave and group velocity, Division and Germer experiment, Heisenberg's uncertainty principle,	**23-24**	
Application of uncertainty principle. Wave functions and wave equation, physical interpretation of wave function and normalization condition,	**25-26**	
Expectation values, Schrodinger's wave equation (Time dependent and time independent i.e. steady, state form) in one dimension,	**27-28**	
Expectation values, Schrodinger's wave equation (Time dependent and time independent i.e. steady, state form) in one dimension,	**29-30**	
quantum-mechanical operators, Particle in a box (Infinite Potential Well), Finite Potential barrier and tunneling.	**31-34**	
SPECIAL THEORY OF RELATIVITY :		
Michelson-Morely experiment,	**35**	
Postulates of special theory of relativity,	**36**	
Consequence of special theory of relativity,	**37**	
Lorentz transformation and its application. (Length contraction and time dilation)	**38**	
NANO-PHYSICS :		
Introduction and Basic definition of Nano Technology,	**39**	
Properties of Nano particles,	**40**	
Elementary ideas of Synthesis of Nano particles,	**41**	
Application of Nano Technology.	**42**	

Institute / School Name :	MIT, Muzaffarpur-842003		
Program Name	**B.Tech. EC & EL**		
Course Code	103201		
Course Name	Physics (Wave, Optics, Quantum Mechanics)		
Lecture / Tutorial (per week):	3/1	**Course Credits**	3.5
Course Coordinator Name	A. Dixit and Dr. S.K. Tiwari		

LECTURE PLAN

Topics	Lecture Number	Date on which the Lecture was taken
Module 1		
MECHANICAL AND ELECTRICAL SIMPLE HARMONIC OSCILLATORS,	**1**	
DAMPED HARMONIC OSCILLATOR, FORCED MECHANICAL	**2**	
AND ELECTRICAL OSCILLATORS	**3**	
IMPEDANCE, STEADY STATE MOTION OF FORCED DAMPED HARMONIC OSCILLATOR	**4**	
Module 2:		
TRANSVERSE WAVE ON A STRING,	**5**	
THE WAVE EQUATION ON A STRING	**6**	
HARMONIC WAVES,	**7**	
REFLECTION AND TRANSMISSION OF WAVES AT A BOUNDARY,	**8**	
IMPEDANCE MATCHING, STANDING WAVES AND THEIR EIGEN FREQUENCIES,	**9**	
LONGITUDINAL WAVES AND THE WAVE EQUATION FOR THEM	**10**	
ACOUSTICS WAVES	**11**	
Module 4		
LIGHT AS AN ELECTROMAGNETIC WAVE AND FRESNEL EQUATIONS,	**12**	
REFLECTANCE AND TRANSMITTANCE,,	**13**	
BREWSTER'S ANGLE	**14**	
TOTAL INTERNAL REFLECTION	**15**	
Module 4		
HUYGENS' PRINCIPLE,	**16**	
SUPERPOSITION OF WAVES AND INTERFERENCE OF LIGHT BY WAVEFRONT SPLITTING AND AMPLITUDE SPLITTING;	**17**	
YOUNG'S DOUBLE SLIT EXPERIMENT	**18**	
NEWTON'S RINGS	**19**	
MICHELSON INTERFEROMETER	**20**	
MACH ZEHNDER INTERFEROMETER	**21**	
FARUNHOFER DIFFRACTION FROM A SINGLE SLIT AND A CIRCULAR APERTURE	**22**	
THE RAYLEIGH CRITERION FOR LIMIT OF RESOLUTION AND ITS APPLICATION TO VISION;	**23**	
DIFFRACTION GRATINGS AND THEIR RESOLVING POWER	**24**	
Module 5		
EINSTEIN'S THEORY OF MATTER RADIATION	**26**	
AMPLIFICATION OF LIGHT BY POPULATION INVERSION	**27**	
AND THEIR STEADY STATE SOLUTIONS,	**28**	
DIFFERENT TYPES OF LASERS: GAS LASERS (HE-NE, CO2)	**29**	
INPUT-OUTPUT CHARACTERISTICS OF LASERS. SEMICONDUCTOR LASER: STRUCTURE,	**30**	
SOLID-STATE LASERS (RUBY, NEODYMIUM),	**31**	
DYE LASERS;		

PROPERTIES OF LASER BEAMS:		
MONO-CHROMATICITY		
MODULE 6:		
WAVE NATURE OF PARTICLES,		
TIME-DEPENDENT AND TIME-INDEPENDENT SCHRODINGER EQUATION FOR WAVE FUNCTION,		
BORN INTERPRETATION, PROBABILITY CURRENT		
EXPECTATION VALUES,		
FREE-PARTICLE WAVE FUNCTION AND WAVE-PACKETS		
UNCERTAINTY PRINCIPLE.		
Module 7		
Module 6:		

Institute / School Name :	MIT, Muzaffarpur 842003		
Program Name	**B.Tech. IT**		
Course Code	105101		
Course Name	Physics: Semiconductor Physics		
Lecture / Tutorial (per week):	3/1	**Course Credits**	3.5
Course Coordinator Name	Dr. S.K. Tiwari and A. Dixit		

LECTURE PLAN

Topics	**Lecture Number**	**Date on which the Lecture was taken**
Module 1		
E-K DIAGRAM, DENSITY OF STATES, OCCUPATION PROBABILITY, FERMI LEVEL AND QUASI-FERMI LEVEL (VARIATION BY CARRIER CONCENTRATION AND TEMPERATURE);	**1**	
P-N JUNCTION, METAL-SEMICONDUCTOR JUNCTION (OHMIC AND SCHOTTKY); CARRIER TRANSPORT, GENERATION, AND RECOMBINATION;	**2**	
SEMICONDUCTOR MATERIALS OF INTEREST FOR OPTOELECTRONIC DEVICES,	**3**	
BANDGAP MODIFICATION, HETEROSTRUCTURES; LIGHT-SEMICONDUCTOR INTERACTION:	**4**	
RATES OF OPTICAL TRANSITIONS,	**5**	
JOINT DENSITY OF STATES,	**6**	

CONDITION FOR OPTICAL AMPLIFICATION.	**7**	
Module 2:		
FREE ELECTRON THEORY,	**8**	
DENSITY OF STATES AND ENERGY BAND DIAGRAMS	**9**	
KRONIG-PENNY MODEL (TO INTRODUCE ORIGIN OF BAND GAP),	**10**	
ENERGY BANDS IN SOLIDS	**11**	
E-K DIAGRAM,	**12**	
DIRECT AND INDIRECT BANDGAPS,	**13**	
TYPES OF ELECTRONIC MATERIALS	**14**	
METALS, SEMICONDUCTORS, AND INSULATORS,	**15**	
DENSITY OF STATES	**16**	
OCCUPATION PROBABILITY,	**17**	
FERMI LEVEL,	**18**	
EFFECTIVE MASS, PHONONS	**19**	
Module 3		
RATE EQUATIONS FOR CARRIER DENSITY,	**20**	
RADIATIVE AND NON-RADIATIVE RECOMBINATION MECHANISMS IN SEMICONDUCTORS,	**21**	
LED: DEVICE STRUCTURE,	**22**	
MATERIALS, CHARACTERISTICS	**23**	
AND FIGURES OF MERIT.	**24**	
Module 4		
REVIEW OF LASER PHYSICS;	**25**	
RATE EQUATIONS FOR CARRIER- AND PHOTON-DENSITY	**26**	
AND THEIR STEADY STATE SOLUTIONS,	**27**	
LASER DYNAMICS, RELAXATION OSCILLATIONS	**28**	
INPUT-OUTPUT CHARACTERISTICS OF LASERS. SEMICONDUCTOR LASER: STRUCTURE,	**29**	
MATERIALS, DEVICE CHARACTERISTICS, AND FIGURES OF MERIT;	**30**	
DFB, DBR, AND VERTICAL-CAVITY SURFACE-EMITTING LASERS (VECSEL),	**31**	
TUNABLE SEMICONDUCTOR LASERS.	**32**	
Module 5:		
TYPES OF SEMICONDUCTOR PHOTODETECTORS	**33**	
-P-N JUNCTION,	**34**	
PIN, AND AVALANCHE AND THEIR STRUCTURE, MATERIALS, WORKING PRINCIPLE, AND CHARACTERISTICS	**35**	
Module 6		
Dual Nature	**36**	
Compton Effect	**37**	
Probality Density	**38**	
Occupation Probability	**39**	
Expectation Value	**40**	
Time dependent and independent Schrodinger equation	**41**	
	42	

DEPARTMENT OF PHYSICS

Assignment 1

1. Suppose the world was actually governed by classical mechanics. In such a classical universe, we might try to build a Hydrogen atom by placing an electron in a circular orbit around a proton. However, we know from 8.03 that a non-relativistic, accelerating electric charge radiates energy at a rate given by the Larmor formula,

$$\frac{dE}{dt} = \frac{-2\,q^2 a^2}{3\,c^3}$$

(incgs units) where q is the electric charge and a is the magnitude of the acceleration. So the classical atom has a stability problem. How big is this effect?

(a) Show that the energy lost per revolution is small compared to the electron's kinetic energy. Hence, it is an excellent approximation to regard the orbit as circular at any instant, even though the electron eventually spirals into the proton.

◦

(b) Using the typical size of an atom (1 A) and a nucleus (1 fm), calculate how long it would take for the electron to spiral into the proton.

◦

(c) Compare the velocity of the electron (assuming an orbital radius of 0.5 A) to the speed of light – will relativistic corrections materially alter your conclusions?

(d) As the electron approaches the proton, what happens to its energy? Is there a minimum value of the energy the electron can have?

Department of Physics

Assignment 2

(a) Light Waves as Particles

The Photoelectric effect suggests that light of frequency ν can be regarded as consisting of photons of energy E = hν, where h =$6.63 \cdot 10^{-27}$ erg · s.

i. Visible light has a wavelength in the range of 400-700 nm. What are the energy and frequency of a photon of visible light?

ii. The microwave in my kitchen operates at roughly 2.5 GHz at a max power of $7.5 \cdot 10^{9}$ ~~erg~~. How many photons per second can it emit? What about a low-power laser (10^{4} ~~erg~~ at 633 nm), or a cell phone ($4 \cdot 10^{6}$ ~~erg~~ at 850 MHz)?

iii. How many such microwave photons does it take to warm a 200ml glass of water by 10°C? (The heat capacity of water is roughly $4.18 \cdot 10^{7}$.)

iv. At a given power of an electromagnetic wave, do you expect a classical wave description to work better for radio frequencies, or for X-rays?

(b) Matter Particles as Waves If a wavelength can be associated with every moving particle, then why are we not
forcibly made aware of this property in our everyday experience? In answering, calculate the de Broglie wavelength $\lambda = \frac{h}{p}$ of each of the following particles:

i. an automobile of mass 2 metric tons (2000 kg) traveling at a speed of 50 mph (22 $\frac{m}{s}$),

ii. a marble of mass 10 g moving with a speed of 10$\frac{cm}{s}$

TUTORIAL SHEET

1. Calculate the de Broglie wavelength for
   (a) a proton of kinetic energy 70 MeV and
   (b) a 100 g bullet moving at 900 ms^{-1}.

2. Estimate the uncertainty in the position of (a) a neutron moving at 5 X 10^6 ms^{-1} and (b) a 50 kg person moving at 2 ms^{-1}.

3. A 45 kW broadcasting antenna emits radio waves at a frequency of 4 MHz.
   (a) How many photons are emitted per second?
   (b) Is the quantum nature of the electromagnetic radiation improtant in analyzing the radiation emitted from this antenna?

4. When light of a given wavelength is incident on a metallic surface, the stopping potential for the photoelectrons is 3.2 V. If a second light source whose wavelength is double that of the first is used, the stopping potential drops to 0.8 V. From these data, calculate
   (a) the wavelength of the first radiation and
   (b) the work function and the cutoff frequency of the metal.

B. Tech 1st Semester Mid-Term Examination (Sample Paper)
Sub.- Physics

Max. Marks 20 **Time: 2 Hours**

Answer any three questions.

1. Write Maxwell's equations in integral and differential form for free space, solve it in terms of electric field, and obtain the expression of the electromagnetic waves in vacuum.

2. What is displacement current? Derive fourth Maxwell equation.

3. Define Compton's effect and obtain an expression for Compton shift.

4. Discuss de-Broglie hypothesis and prove it experimentally.

5. Explain time dependent Schrodinger wave equation.

6. Write short note on any two of the followings:

(a) Energy stored in electrostatic field.

(b) Three electric vectors.

(c) Explain relativity and give postulates of special theory of relativity.

(d) Discuss polarised and un-polarised light.

B. Tech 1st Semester Mid-Term Examination
Sub.- Physics (Sample Paper)

PHYSICS *Time*: 2 hours*Full Marks*: 20

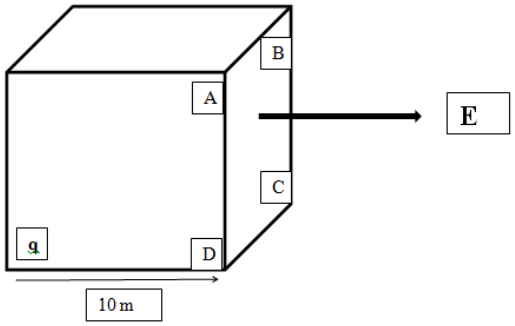
Instructions:

(i) There are six questions in the paper.

(ii) Attempt any four questions.

(iii) All questions carry equal marks.

(1) Calculate the flux passes through the surface ABCD of a hollow cube of side 10 meter each where charge 'q' sitting at one of the corner. What happen if that charge moves outside of the cube? [5]



(2) Prove that electric vector in always perpendicular to direction of propagation of EM wave. [5]

(3) (a) Draw the energy level diagram for 'He-Ne' LASER.[3]

(b) Why four levels LASER are better than three levelsLASER?[2]

(4) Attempt any**two** questions[2.5x2]

(a)What do you understand by the diffraction of light? Describe the various types of diffractions for light wave.

(b)Write the expression for the diffraction of the light with single slit.Draw the pattern of intensity at various orientations for the diffraction of light with single slit .

(c)What is the significance of surface to volume ratio in nanoparticles?

(5) (a) What do you understand by theMalu's Law?[2.5]

(b) Describe the different methods of production of polarized light.[2.5]

(6) Write short note on any **two** of following[2.5x2]

(a) Population inversion in LASER

(b) Electromagnetic induction

(c)Polarized and unpolarized light

(d) Lorentz transformation

MUZAFFARPUR INSTITUTE OF TECHNOLOGY, MUZAFFARPUR

B. Tech 1st Year Question Bank

1. **SECTION A**

a) What is the physical significance of curl of a vector field?
b) State Poynting theorem and interpret each term in its expression.
c) What is the atomic origin of Para magnetism exhibited by certain materials?
d) What are the essential conditions for a unit cell to be called a primitive cell?
e) What is population inversion and give its significance in lasing action?
f) How does light propagate through an optical fiber?
g) Give basic postulates of special theory of relativity.
h) Justify why an electron can't be accelerated in a cyclotron. i) List properties of a well behaved wave functions for a given system. j) Give a brief and broad outline of synthesis of nanomaterials through chemical vapors deposition.

2. **SECTION-B**

a) Derive the equations of electromagnetic waves propagation through free space. Further deduce important properties of EM wave propagation in free space.
b) What is Ampere's circuital rule? What is the drawback of this rule and how it was accounted for by Maxwell?
c) Describe how ultrasonic waves are generated using the method of magnetostriction.
d) What are type I and type II superconductors and give their distinguishing features.
e) What is Bragg's law. Derive the Bragg's condition for x-ray diffraction. What are the limitations of Bragg's law?
f) A certain orthorhombic crystal has a ratio of a : b : c of 0.428:1:0.376. Find Miller indices of the faces with intercepts 0.214:1:0.188. 3 5.
g) Discuss the construction and working of a Semiconductor laser.
h) Give a qualitative idea of formation and reconstruction of hologram.

3. **SECTION-C**

a) What are different kinds of optical fibers? How is light wave guided through an optical fiber? Derive and interpret the numerical aperture of an optical fiber.
b) Give various kinds of dispersion suffered by the light wave while propagating through an optical fiber.
c) How is Heisenberg's uncertainty principle a natural consequence wave nature of moving particles?
d) Consider a particle of mass m trapped in an one dimensional box of infinite depth. Using steady state Schrodinger's equation obtain permissible states and corresponding energies of the particle.
e) Derive the expression for variation of mass of a relativistic body with velocity.
f) The mean life of a muon, when it is at rest, is 2.2μs. Calculate the average distance it will travel in vacuum before it decays, if it has velocity of 0.9c.

g) Discuss sol-gel technique for synthesis of nanomaterials.
h) Write a short note on properties of nanomaterials which distinguish it from bulk matter

4. **SECTION-D**

a) Differentiate between dielectrics and conductors by taking suitable example(s).
b) Define Poynting vector.
c) Suggest some method to detect Ultrasonic waves
d) What is meant by stimulated emission?
e) What is meant by space lattice? f) What do you mean by pulse broadening?
f) What is the outcome of Michelson Morley Experiment?
g) Where do we use Lorentz transformations, and why. i) What do you understand by Eigen functions. j) Explain electron confinement.

5. **SECTION E**

a) What do you understand by displacement current . Suggest a method to calculate it.
b) Solve Maxwell's equations in time varying fields.
c) A magnetizing field of 1400 Am-1 produces a magnetic flux of 3x10-5 weber in an iron bar of cross sectional area 0.3 cm2. Calculate permeability and susceptibility of the bar.
d) What do you understand by ferrites? Discuss their main applications. A. Find the maximum frequency present in the radiation from an X-ray tube whose accelerating potential is 5x104 V. B. Discuss working principle and construction of Braggs spectrometer.
e) Using appropriate energy level diagram, discuss the working of He-Ne laser.
f) Discuss relevance of Einstein's coefficients in context of Lasing mechanism.

6. **SECTION F**

a) A glass fiber has a core material of refractive index 1.50 and cladding material of refractive index 1.45. If it is surrounded by air, compute the critical angle (i) at core-cladding boundary and (ii) at cladding -air boundary.
b) Discuss merits and demerits of multi-mode optical fibres.
c) The mass of a moving electron is 8 times its rest mass. Find its kinetic energy and momentum.
d) What do you understand by simultaneity in relativity.
e) Derive time independent Schrodinger wave equation and discuss its significance in today's context.
f) What is the significance of quantum mechanics for macroscopic bodies.
g) Explain the concept of Super-Para magnetism in view of Nano synthesis.
h) Discuss some important application(s) of Nano particles

Code : 221101

B.Tech 1st Semester Exam., 2014

PHYSICS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

(ii) There are ***NINE*** *questions in this paper.*

(iii) Attempt ***FIVE*** *questions in all.*

(iv) Question No. ***1*** *is compulsory.*

1. Answer any *seven* questions 2×7=14

(a) Derive the relativistic kinetic energy of a particle of rest mass m_0 moving with velocity v.

(b) A quarter wave plate is designed for 6000 Å. Find phase retardation for 4500 Å if change in refractive index is negligible.

(c) What is the de Broglie wavelength associated with electrons made to move from rest under a potential difference of 500 volts?

(d) Show that population inversion is not possible by direct excitation from a lower to higher level.

(e) What is the amount of work done in accelerating a body from rest to 0·6 c ?

(f) Why is diffraction of sound more evident than light waves in our daily life?

(g) What are the differences of temporal coherence and spatial coherence?

(h) What do you mean by solenoidal and irrotational vectors?

(i) Why should the wave function be normalized to 1?

(j) Explain the meaning of quantum mechanical tunnelling. Mention two examples where this phenomenon is observed.

2. Write down Maxwell's field equations, explaining the terms used. Show that in vaccum both electric and magnetic vectors obey wave equation. Assuming a plane wave solution, show that magnetic field is always orthogonal to the electric field. 14

3. (a) What do you mean by diffraction of light? Can X-ray produce diffraction of light? 4

(b) Derive the expression of intensity at a point for Fraunhofer diffraction due to double slit. Draw the intensity distribution curve and explain it. 10

4. (a) State Malus' law and prove it. 4

(b) Discuss Nicol prism as polarizer and analyzer. 4

(c) How are unpolarized, plane polarized, circularly polarized and elliptically polarized light distinguished? 6

5. (a) Explain three-level and four-level laser schemes. 3

(b) Can we have two-level laser? Justify your answer. 3

(c) Explain the working principle and construction of a ruby laser. 8

6. (a) What are inertial frames of reference? Discuss the basic postulates of a special theory of relativity. Mention some of the consequences of special theory of relativity. 8

(b) Derive Lorentz transformation equations on the basis of postulates of special theory of relativity. 6

7. (a) Obtain the expression for stationary energy levels for particle of mass m which is free to move in a region of zero potential between two rigid walls at $x = 0$ and $x = l$. Are the energy levels degenerate? 9

(b) Prove that the wave function $\psi(x, t) = A\cos(kx - \omega t)$ does not satisfy the time-dependent Schrödinger equation for a free particle. 5

8. (a) State Wien's radiation formula and give its limitations. 4

(b) State clearly explaining all the terms Planck's law, Rayleigh-Jeans law and Wien's displacement law for radiation. Find out the two limits at which the Planck's formula reduces to the other two. 10

9. Write short notes on the following : 7+7=14

(a) Scalar and vector potentials

(b) Quantum confinement effects in nano-materials

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Code : 221101

B.Tech 1st Semester Exam., 2015

PHYSICS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Answer any *seven* questions : 2×7=14

(a) Find the capacitance of a capacitor which stores 0·24 coulomb at 10 volts.

(b) What do you mean by degrees of freedom of a system?

(c) Mention any two properties of nano-particles.

(d) What is the velocity of electromagnetic wave in free space and in lossless dielectric?

(e) What is the net capacitance if three 10 μF capacitors are connected in parallel?

(f) Define Poynting vectors.

(g) Voltage applied across a ceramic dielectric produces an electrolytic field 100 times greater than air. What will be the value of dielectric constant?

(h) What is meant by laser welding?

(i) What is the practical significance of dielectric strength?

(j) What do you mean by solenoidal and irrotational vectors?

2. *(a)* Describe any two methods of production of nanomaterials. 8

(b) State Wien's radiation formula and give its limitations. 6

3. Explain in detail how optical fibres are classified according to the material, refractive index and modes of propagation. 14

4. *(a)* Explain the working principle and construction of a ruby laser. 10

(b) Calculate the de Broglie wavelength associated with an electron of energy 1·5 eV. 4

5. (a) Explain the construction and working of CO_2 laser with its advantages. 12

(b) Give physical interpretation of wave function. 2

6. (a) Show that plane polarised and circularly polarised light are the special cases of elliptically polarised light. 8

(b) Explain normalized and orthogonal wave functions. 6

7. Write short notes on the following : 5+5+4=14

(a) Brewster's law

(b) Gauss's law in dielectric

(c) Photoelectric effect

8. (a) Explain in brief Compton effect on the basis of quantum hypothesis. What is its physical significance? 8

(b) In Compton experiment, the wavelength of X-ray radiation scattered at an angle of 45° is 0·022 Å. Calculate the wavelength of the incident X-rays. 6

9. (a) Derive the Poynting theorem and give its significance. 10

(b) Describe briefly about reflection coefficient and transmission coefficient. 4

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Code : 221101

B.Tech 1st Semester Examination, 2016

Physics

Time : 3 hours *Full Marks : 70*

Instructions :

(i) There are Nine Questions in this Paper.

(ii) Attempt five questions in all.

(iii) ***Question No. 1 is Compulsory.***

(iv) The marks are indicated in the right-hand margin.

(v) Symbols used (in any) have their usual meaning

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1. Answer any seven questions: 2×7=14

(a) Write down Maxwell's equations in differential forms in a free space.

(b) Define Poynting vector.

(c) Write down expression for resultant intensity due to Fraunhofer diffraction grating.

(d) Define population inversion.

(e) What do you mean by double refraction?

(f) What do you mean by elliptically polarised light?

(g) What is photo electric effect?

(h) Write down Schrodinger's time independent wave equation in one dimension.

(i) What is length contraction?

(j) Write down applications of nanotechnology.

2. (a) List the properties of nanomaterials? How nanomaterials are different from their bulk counterparts? Describe any one method used for the synthesis of nanomaterials. 8

(b) Explain Davisson and Germer experiment. Clearly write down findings of this experiment. 6

3. What are the Einstein's coefficients? Derive their relations. Describe working principle of Helium-Neon laser. 3+3+8=14

4. Write down postulates or special theory of relativity. Derive Lorentz transformation equations for space and time coordinates. Show that when v << c, than Lorentz transformations converts into Galilean transformations. 2+10+2=14

5. Using Maxwell's equations, show that electromagnetic waves are transverse in nature. If magnitude of $\overline{H}$ in a plane wave is 1 amp/met, find the magnitude of $\overline{E}$ for a plane wave in free space. Express your result with proper units. 10+4=14

[Given; $\mu_0 = 4\pi \times 10^{-7}\ \frac{H}{m}$; $\varepsilon_0 = 8.85 \times 10^{-12}\ C^2 / Nm^2$]

6. Write short notes on the followings: 3+6+5=14

(a) Wave function and its physical significance.

(b) Derive Schrodinger's time Independent equation.

(c) The Tunnel effect OR Tunnelling.

7. (a) What is temporal coherence ? 2+12=14

(b) Discuss Fraunhofer's diffraction at single-slit. Find the positions of maxima and minima.

8. Explain the following : 2×7=14

(a) How would you obtain plane polarised light by reflection?

(b) What are the ordinary and extra-ordinary rays?

(c) How would you distinguish between unpolarised and plane polarised light?

(d) Plane of polarisation and plane of vibration.

(e) How would you distinguish between circularly polarised and unpolarised light?

(f) How would you distinguish between circularly polarised and elliptically polarised light?

(g) How will you convert left elliptically polarised light into right elliptically polarised light?

9. (a) Calculate the percentage contraction of a rod moving with a velocity 0.8c in a direction indicated at 60° to its own length. 6

(b) Find the stored energy in a system of three equal charges, Q = 2 nC. arranged in a line with 0.5 m separation between them. 4

(c) Which of the following cannot have physical significance in the interval shown ? Why not ? 4

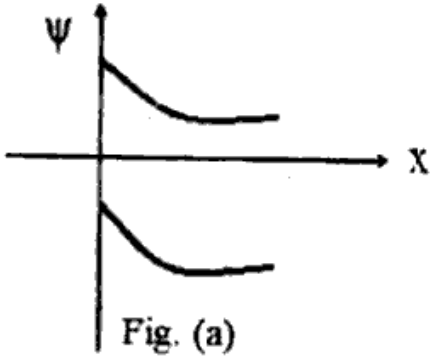

Fig. (a)

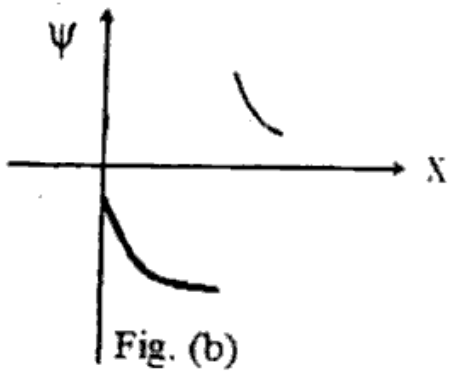

Fig. (b)

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Code : 221201

B.Tech. 2nd Semester Exam., 2014

PHYSICS

Time : 3 hours | *Full Marks* : 70

Instructions :

(i) All questions carry equal marks.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Answer any *seven* subquestions of the following :

(a) Calculate the average value of Poynting vector at the surface of the sun if the power radiated by the sun is 4×10^{25} W and its radius is 7×10^{8} m.

(b) A meter scale is moving along its length with a velocity 0·8 C. Calculate its length as it appears to an observer on the earth.

(c) Calculate Compton shift if X-rays of wavelength 1·0 Å are scattered from a carbon block. The scattered radiation is viewed at 90° to the incident beam.

(d) Write Rayleigh–Jeans formula for black-body radiation and identify the terms.

(e) Explain stimulated emission of radiation in laser.

(f) Establish a relation between coherence length and linewidth.

(g) An optical filter has a linewidth of 1·5 nm and mean wavelength 550 nm with white light incident on the filter, calculate coherence length.

(h) What is optic axis? What is its significance?

(i) A laser is essentially a converter of energy. Explain.

(j) A particle of mass 0·2 mg is in a one-dimensional potential well of width 1 mm. Find the ground state energy.

2. *(a)* Describe briefly Michelson-Morley experiment and the significance of the experimental results.

(b) Establish Einstein mass-energy relation.

3. *(a)* Prove that classical theory does not hold in the region of atomic dimension.

(b) State the characteristics of black-body radiations.

(c) Show graphically how the energy density vs. freq. plot of black-body radiations is changed if the temperature is increased.

(Continued)

4. (a) Explain the wave-particle duality phenomenon.

(b) State de Broglie hypothesis and prove it.

(c) Calculate the wavelength associated with an electron having an energy of 1000 eV.

5. (a) State the differences between laser and normal light.

(b) What are the different transition processes involved with lasing action?

(c) State some applications of laser.

6. (a) Explain briefly Huygens's principle for the propagation of light.

(b) Derive an expression for the intensity distribution due to Fraunhofer diffraction at a single slit.

7. (a) Explain the phenomenon of double refraction in uniaxial crystal.

(b) Describe the construction of a Nicol prism and show how it can be used as a polarizer and as an analyzer.

8. What do you understand by nanoparticles? Based on *I-V* characteristic, discuss the electrical properties of nanoparticles.

9. Write short notes on any *two* of the following :

(a) Ruby laser

(b) Concept of ether

(c) Poynting vector

(d) Displacement current

★ ★ ★

Code : 221201

B.Tech 2nd Semester Exam., 2015

PHYSICS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Answer any *seven* of the following questions : 2×7=14

(a) Prove that the given vector $\vec{A}$ is solenoidal vector, where

$$\vec{A} = 3y^2z^2\hat{i} + 3x^2z^2\hat{j} + 3x^2y^2\hat{k}$$

(b) Calculate the value of Poynting vector at the surface of the sun if the power radiated by the sun is 4×10^{26} W and its radius is 7×10^{8} m.

(c) Prove the nonexistence of isolated magnetic poles.

(d) Calculate the relative population of sodium atoms in a sodium lamp of wavelength 590 nm in the first excited state and in the ground state at a temperature 300 °C.

(e) What are the characteristics of a laser?

(f) Determine the de Broglie wavelength of a ball of mass 0·050 kg moving at 1 m/s.

(g) What are the assumptions of Planck's quantum theory?

(h) Define dielectric constant and polarization.

(i) The refractive index of water is 1·33. Calculate the polarizing angle for water.

(j) How many cubes of 1 nm on each side can be curved out of a cube 1 m on each side?

2. Derive Lorentz transformation equations and using them derive expression for length contraction and time dilation. Show that

$$x'^2 - c^2t'^2 = x^2 - c^2t^2$$ 6+3+3+2=14

3. *(a)* What are the different transition processes involved with lasing action? 5

(b) What is population inversion? Explain. 5

(c) Find the energy difference between the two energy levels of neon atoms of a He-Ne gas laser. 4

4. Discuss the principle, construction and action of a Nicol prism. Calculate the velocities of ordinary and extraordinary rays in calcite crystal in a plane perpendicular to the optic axis. The refractive indices of calcite crystal for E-ray and O-ray are 1·485 and 1·659 respectively. 2+3+6+3=14

5. *(a)* Obtain the expression for stationary energy levels for particle of mass m which is free to move in a region of zero potential between two rigid walls at $x=0$ and $x=4$. Are the energy levels degenerate? 8+2=10

   (b) Evaluate the expectation value $\langle x \rangle$ for a one-dimensional potential box of length L in the ground state. 4

6. *(a)* State Maxwell's equation in integral form. 6

   (b) Obtain an expression for the speed of propagation of the plane e.m. wave in terms of permittivity and permeability of the medium. 8

7. *(a)* Derive the relation $\vec{D} = \varepsilon_0 \vec{E} + \vec{P}$, where the terms have their usual meanings. 7

   (b) Prove that the tangential component of the electric field intensity vector and the normal component of the electric displacement vector are continuous across the boundary between two different dielectric media. 7

8. *(a)* State and explain Einstein's equation for explaining photoelectric emission. 2+6=8

   (b) Why does the unmodified line appear in Compton scattering? 6

9. Write short notes on any *two* of the following : 7×2=14

   (a) Displacement current

   (b) Galilean transformation

   (c) Spatial coherence

   (d) Sol-gel technique

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Code : 221201

B.Tech 2nd Semester Examination, 2017

Physics

Time : 3 hours *Full Marks : 70*

Instructions :

*(i) There are **Nine** Questions in this Paper.*

*(ii) Attempt **Five** questions in all.*

*(iii) **Question No. 1 is Compulsory.***

(iv) The marks are indicated in the right-hand margin.

1. (a) Write down Gauss law. 2×7

(b) What is poynting theorem?

(c) Draw the energy level diagram for He-Ne laser.

(d) What do you mean by Rayleigh criterion?

(e) Write a short note on magneto-elastic effect.

(f) Briefly explain Einstein's photoelectric equation.

(g) Briefly describe the Davisson-Germer experiment.

(h) Explain briefly the concept of tunnelling in wave mechanics.

(i) Write down the Lorentz transformation equations in relativity.

(j) Briefly explain the importance of surface to volume ratio in nanotechnology.

P.T.O.

2. (a) Prove that $D = \varepsilon_0 E + P$ 5

(b) Derive the boundary conditions for D and H at the interface of two dielectrics; hence prove Snell's laws of electrostatics. 5

(c) It is found that $E = 60a_x + 20a_y - 30a_z$ mV/m at a particular point on the interface between air and a conducting surface. Find D at that point. 4

3. (a) Write down the generalized forms of Maxwell's equations and discuss their physical interpretations. 4

(b) Using Maxwell's equations show that light is an electromagnetic wave. 4

(c) Calculate the skin depth δ and the wave velocity at a frequency of 1.6 MHz in aluminium for which $\sigma = 38.2$ MS/m and $\mu_r = 1$. 6

4. (a) Explain the concept of temporal and spatial coherence. 4

(b) What do you mean by stimulated emission ? Derive the relation between Einstein's A and B coefficients. 5

(c) Explain the working of a solid state laser. 5

5. (a) What is the difference between polarised and unpolarised light? 2

(b) A glass plate is used as a polariser. Find the angle of polarisation and the angle of refraction. Given μ for glass = 1.54. 3

(c) Two Nicol prisms are crossed to each other. Now one of them is rotated through 60°. What percentage of incident polarised light will pass through the system? Explain your answer. 4

(d) Explain the principle of birefringence. Explain how birefringence can be used to calculate the stress in a material. 5

6. (a) What do you mean by UV catastrophe? Show that Planck's law merges with the Rayleigh Jeans at low frequencies. 4

(b) Derive the wavelength shift for a photon in a Compton scattering process. 5

(c) Determine the size of hydrogen atom using uncertainty principle. Give that potential energy $V = \frac{-e^2}{4\pi\varepsilon_0 a}$ where a is the distance of the electron from the nucleus. 5

7. (a) Set up the Schrodinger's equation for a particle trapped in a box. Solve the equations and normalize the wave function. Discuss the physical interpretation of the obtained energy eigenvalues. 10

(b) A particle limited to the x-axis has the wavefuntion $\psi = ax$ between $x = 0$ and $x = 1$; $\psi = 0$ elsewhere. Find the probability that the particle can be found between

$x = 0.45$ and $x = 0.55$. Also find the expectation value (x) of the particle's position. 4

8. (a) Write down the postulates of special theory of relativity. 2

(b) What do you mean by time dilation and length contraction? 3

(c) A spacecraft is moving relative to earth. An observer on the earth finds that, between 1 PM and 2 PM according to her clock, 3601 s elapse on the spacecraft's clock. What is the spacecraft's speed relative to earth? 4

(d) A stationary body explodes into two fragments each of mass 1.0 kg that move apart at speeds of 06 c relative to the original body. Find the mass of the original body. Explain the interpretation of your answer. 5

9. Write short notes on:

(a) Tops down and bottoms-up technique 4

(b) Quantum confinement in semiconducting nanostructures 5

(c) Applications of nanotechnology in the field of medicine and therapy

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Code : 211202

B.Tech 2nd Semester Exam., 2015

MATHEMATICS—II

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

(ii) There are ***NINE*** *questions in this paper.*

(iii) Attempt ***FIVE*** *questions in all.*

(iv) Question No. ***1*** *is compulsory.*

1. Choose the correct or best alternatives (any *seven*) : 2×7=14

(a) In a series of positive terms Σu_n, if

$$\lim_{n\to\infty} u_n \neq 0$$

then the series Σu_n is

(i) convergent

(ii) divergent

(iii) not convergent

(iv) oscillatory

(b) The p-series $\frac{1}{1^p}+\frac{1}{2^p}+\frac{1}{3^p}+\cdots$ to ∞ is divergent for

(i) $p=1$ *(ii)* $p>1$

(iii) $p<1$ *(iv)* $p\leq 1$

(c) The series $a-a+a-a+a-\cdots$ to ∞ is

(i) convergent

(ii) divergent

(iii) oscillatory

(iv) None of the above

(d) The Laplace transform of a signal $y(t)$ is

$$y(s)=\frac{1}{s(s-1)'}$$

then its final value is

(i) −1

(ii) 0

(iii) 1

(iv) unbounded

(e) The Laplace transform of the function $f(t)=t$, starting at $t=a$ is

(i) $\frac{1}{(s+a)^2}$ *(ii)* $\frac{e^{-as}}{(s+a)^2}$

(iii) $\frac{e^{-as}}{s^2}$ *(iv)* $\frac{a}{s^2}$

(f) If from the function $f(t)$ one forms the function $\psi(t) = f(t) + f(-t)$, then $\psi(t)$ is

(i) even

(ii) odd

(iii) neither even nor odd

(iv) both even and odd

(g) The triple integral $\iiint_T dx\,dy\,dz$ gives

(i) volume of region T

(ii) surface area of region T

(iii) area of region T

(iv) density of region T

(h) The double integral

$$\int_0^{\pi/2}\int_0^{\pi/2} \sin(x+y)\,dx\,dy$$

is

(i) 0

(ii) π

(iii) $\pi/2$

(iv) 2

(i) $\nabla\times(\nabla\times\vec{A})$, where $\vec{A}$ is a vector, is equal to

(i) $\vec{A}\times\nabla\times\vec{A} - \nabla^2\vec{A}$

(ii) $\nabla^2\vec{A} + \nabla(\nabla\cdot\vec{A})$

(iii) $\nabla^2\vec{A} + \nabla\times\vec{A}$

(iv) $\nabla(\nabla\cdot\vec{A}) - \nabla^2\vec{A}$

(j) If $(\vec{A}\times\vec{B})\times\vec{C} = \vec{A}\times(\vec{B}\times\vec{C})$, then

(i) $\vec{A}, \vec{B}$ are collinear

(ii) $\vec{A}, \vec{B}$ are perpendicular

(iii) $\vec{A}, \vec{C}$ are collinear

(iv) $\vec{A}, \vec{C}$ are perpendicular

2. (a) Test for convergence the series whose nth term is $n^{\log x}$.

(b) Test the series for convergence

$$1 + \frac{3}{7}x + \frac{3\cdot 6}{7\cdot 10}x^2 + \frac{3\cdot 6\cdot 9}{7\cdot 10\cdot 13}x^3 + \frac{3\cdot 6\cdot 9\cdot 12}{7\cdot 10\cdot 13\cdot 16}x^4 + \cdots \text{ to } \infty$$

14

3. *(a)* Define absolutely and conditionally convergent series. Show that the series

$$1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}+\cdots \text{ to } \infty$$

is convergent but not absolutely convergent.

(b) Find the Fourier series expansion of the periodic function of period 2π

$$f(x)=x^2, \quad -\pi \le x \le \pi$$

Hence find the sum of the series

$$\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\cdots$$ 14

4. *(a)* Find the Fourier series for $f(x)$, where

$$f(x)=\begin{cases}-\pi, & -\pi < x < 0\\ x, & 0 < x < \pi\end{cases}$$

Hence deduce that

$$\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots=\frac{\pi^2}{8}$$

(b) Find the Fourier half-range even expansion of the function

$$f(x)=-\frac{x}{e}+1, \; 0 \le x \le e$$ 14

5. *(a)* Find the Laplace transform of—

(i) $t^2 \cos at$;

(ii) $e^{-4t}\frac{\sin 3t}{t}$.

(b) Find the Laplace transform of $\frac{1-\cos t}{t^2}$. 14

6. *(a)* Show that

$$\int_0^1 dx \int_0^1 \frac{x-y}{(x+y)^3}\,dy \ne \int_0^1 dy \int_0^1 \frac{x-y}{(x+y)^3}\,dx$$

(b) Evaluate $\iint r^4 \cos^3\theta \, dr\, d\theta$ over the interior of the circle $r=2a\cos\theta$. 14

7. *(a)* Evaluate :

$$\int_1^e \int_1^{\log y} \int_1^{e^x} \log z \, dx\, dy\, dz$$

(b) Find the length of the arc of the curve $y=e^x$ from the point (0, 1) to (1, e). 14

8. *(a)* Find the directional derivatives of $\phi = xy^2 + yz^2$ at the point (2, −1, 1) in the direction of the vector $\hat{i}+2\hat{j}+2\hat{k}$.

(b) Find the magnitude of the velocity and acceleration of a particle which moves along the curve $x=2\sin 3t$, $y=2\cos 3t$, $z=8t$ at any time $t>0$. Find unit tangent vector to the curve. 14

9. *(a)* If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then prove that

$$\text{div}(\text{grad}\, r^n) = n(n+1)r^{n-2}$$

(b) Evaluate $\int_C \vec{F} \cdot d\vec{r}$, where

$$\vec{F} = (x^2 + y^2)\hat{i} - 2xy\hat{j}$$

and C is the rectangle in the xy-plane bounded by $y = 0$, $x = a$, $y = b$, $x = 0$. 14

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