




राम सकल सिंह साइंस कॉलेज, सीतामढ़ी

(A CONSTITUENT UNIT OF BRABU, MUZAFFARPUR)



Faculty Details Proforma for College Website

Name	Dr. Pankaj Kumar Singh	Photograph
Designation	Assistant Professor	
Department	Physics	
Phone No. Office		
Mobile	9905298612	
Email	Psmintu68@gmail.com	
Web-Page		
Educational Qualifications		
Degree	College/University	Year
Ph.D.	Jai Prakash University, Chapra	2018
M.Phil.		
PG	Jai Prakash University, Chapra	2010
UG	Jai Prakash University, Chapra	2007
Any other qualification	UGC-CSIR NET	2020
Career Profile		
<p>Dr. Pankaj Kumar Singh is currently serving as the Assistant Professor and Head of the Department of Physics at Ram Sakal Singh Science College in Sitamadhī, affiliated with BRABU. He has over 10 years of experience in teaching Physics, during which he has engaged in undergraduate and postgraduate education, research, and the monitoring and evaluation of various state university programs. He has also been involved in training and capacity-building initiatives.</p>		
Administrative Assignments		
Areas of Interest/Specialization		
<ul style="list-style-type: none">➤ Deliver high-quality lectures and laboratory sessions for undergraduate and postgraduate physics courses.➤ Conduct original research in the field of physics and publish findings in reputable journals.➤ Supervise and mentor students in their academic and research projects.➤ Participate in departmental meetings, curriculum development, and program evaluations.➤ Engage in community outreach and capacity-building initiatives to enhance science education.		
Paper Taught		

Research Guidance

List against each head (If applicable):

- | | |
|---|------|
| 1. Supervision of awarded Doctoral Thesis | - No |
| 2. Supervision of Doctoral Thesis, under progress | - No |
| 3. Supervision of awarded M.Phil. dissertations | -No |
| 4. Supervision of M.Phil. dissertations, under progress | -No |

Publications Profile

List against each head (If applicable) (as Illustrated with examples)

1. Books/Monographs (Authored/Edited)

(i) **Physics of Electronics**

Table of Contents

1. Introduction to Electronics

- 1.1: What is Electronics?
 - 1.2: Role of Physics in Electronics
 - 1.3: Historical Overview: From Vacuum Tubes to Quantum Devices
 - 1.4: Applications of Electronics in Modern Technology
-

2. Electrical Conductivity and Materials

- 2.1: Conductors, Insulators, and Semiconductors
 - 2.2: Electrical Properties of Materials
 - 2.3: Band Theory of Solids
 - Band Gap and its Significance
 - Fermi Level and Electron Occupation
 - 2.4: Mobility, Resistivity, and Conductance
-

3. Quantum Mechanics in Electronics

- 3.1: Wave-Particle Duality and Electron Behavior
 - 3.2: Schrödinger Equation and Potential Wells
 - 3.3: Quantum Tunneling and its Applications
 - 3.4: Energy Quantization in Semiconductor Devices
-

4. Semiconductor Physics

- **4.1:** Intrinsic and Extrinsic Semiconductors
 - **4.2:** Charge Carriers: Electrons and Holes
 - **4.3:** Doping and Carrier Concentration
 - **4.4:** Carrier Mobility and Recombination
-

5. The PN Junction

- **5.1:** Formation of the PN Junction
 - **5.2:** Depletion Region and Junction Potential
 - **5.3:** Current-Voltage Characteristics
 - **5.4:** Applications in Rectification and Switching
-

6. Diodes

- **6.1:** Types of Diodes
 - Zener Diodes
 - Light Emitting Diodes (LEDs)
 - Photodiodes and Solar Cells
 - **6.2:** Working Principles and Circuit Models
 - **6.3:** Applications of Diodes in Electronics
-

7. Bipolar Junction Transistors (BJTs)

- **7.1:** Structure and Working Principle
 - **7.2:** Modes of Operation: Active, Saturation, and Cutoff
 - **7.3:** Current Amplification and Gain
 - **7.4:** Applications in Amplifiers and Switches
-

8. Field Effect Transistors (FETs)

- **8.1:** Types of FETs
 - JFET (Junction Field Effect Transistor)
 - MOSFET (Metal Oxide Semiconductor Field Effect Transistor)
 - **8.2:** Operation and Characteristics
 - **8.3:** Applications in Modern Electronics
 - **8.4:** Power and Efficiency Considerations
-

9. Solid-State Devices

- **9.1:** Basics of Solid-State Physics

- **9.2:** Thyristors and Triacs
 - **9.3:** Tunnel Diodes and Gunn Diodes
 - **9.4:** High-Efficiency Devices: IGBTs and Power Electronics
-

10. Optoelectronics

- **10.1:** Interaction of Light with Semiconductors
 - **10.2:** Photodetectors and Phototransistors
 - **10.3:** LEDs and Lasers
 - **10.4:** Fiber Optic Communication Systems
-

11. Digital Electronics

- **11.1:** Introduction to Logic Gates and Circuits
 - **11.2:** Boolean Algebra and Simplification
 - **11.3:** Flip-Flops, Counters, and Registers
 - **11.4:** Analog to Digital (ADC) and Digital to Analog (DAC) Converters
-

12. Integrated Circuits (ICs)

- **12.1:** Basics of IC Fabrication
 - **12.2:** Types of ICs: Analog, Digital, and Mixed-Signal
 - **12.3:** CMOS Technology
 - **12.4:** Applications in Microprocessors and Memory Devices
-

13. Power Electronics

- **13.1:** Basics of Power Conversion
 - **13.2:** Rectifiers, Inverters, and Converters
 - **13.3:** Switched-Mode Power Supplies (SMPS)
 - **13.4:** Applications in Renewable Energy Systems
-

14. Noise and Signal Processing in Electronics

- **14.1:** Sources of Noise in Electronic Circuits
 - **14.2:** Signal Amplification and Filtering
 - **14.3:** Analog and Digital Signal Processing
 - **14.4:** Applications in Audio, Video, and Communication Systems
-

15. Advanced Topics in Electronics

- **15.1:** Quantum Electronics and Spintronics
 - **15.2:** Nanoelectronics: Devices and Applications
 - **15.3:** Flexible and Wearable Electronics
 - **15.4:** Artificial Intelligence and Electronics Integration
-

16. Laboratory Techniques and Instrumentation

- **16.1:** Tools for Electronic Circuit Analysis and Design
 - **16.2:** Oscilloscopes, Multimeters, and Spectrum Analyzers
 - **16.3:** Circuit Prototyping and Testing Techniques
 - **16.4:** Safety Measures in Electronic Laboratories
-

17. Applications of Electronics in Technology

- **17.1:** Consumer Electronics (Smartphones, TVs, etc.)
 - **17.2:** Medical Devices and Healthcare Applications
 - **17.3:** Space and Defense Electronics
 - **17.4:** Internet of Things (IoT) and Automation
-

18. Challenges and Future Directions

- **18.1:** Environmental Impact of Electronics
- **18.2:** Energy-Efficient Devices and Green Electronics
- **18.3:** Miniaturization and Moore's Law
- **18.4:** Future Trends in Electronics Research

(ii) Understanding Dynamics (working)

Proposed Table of Contents

1. Introduction to Dynamics

- **1.1:** What is Dynamics?
 - **1.2:** The Role of Dynamics in Physics and Engineering
 - **1.3:** Historical Development of Dynamics: From Aristotle to Newton
 - **1.4:** Applications of Dynamics in Modern Technology
-

2. Kinematics of Particles

- **2.1:** Rectilinear Motion
 - Uniform and Non-Uniform Motion
 - Equations of Motion for Constant Acceleration
 - **2.2:** Curvilinear Motion
 - Motion in 2D and 3D
 - Projectile Motion and Trajectories
 - **2.3:** Relative Motion and Frames of Reference
 - **2.4:** Velocity and Acceleration Analysis
-

3. Kinetics of Particles

- **3.1:** Newton's Laws of Motion
 - First Law: Inertia
 - Second Law: Force and Acceleration
 - Third Law: Action and Reaction
 - **3.2:** Forces in Dynamics
 - Gravitational, Normal, and Frictional Forces
 - Tension and Applied Forces
 - **3.3:** Work-Energy Principle for Particles
 - **3.4:** Impulse and Momentum
 - Linear Momentum Conservation
 - Collisions: Elastic and Inelastic
-

4. Dynamics of Systems of Particles

- **4.1:** Center of Mass
 - **4.2:** Motion of the Center of Mass
 - **4.3:** Energy and Momentum in Systems of Particles
 - **4.4:** Collisions in Multi-Particle Systems
-

5. Rigid Body Kinematics

- **5.1:** Translation and Rotation of Rigid Bodies
 - **5.2:** Angular Velocity and Angular Acceleration
 - **5.3:** Rotational Motion with Fixed Axis
 - **5.4:** General Plane Motion
-

6. Rigid Body Kinetics

- **6.1:** Newton's Second Law for Rotation
- **6.2:** Moment of Inertia and Torque
- **6.3:** Work and Energy in Rotational Motion

- **6.4:** Angular Momentum Conservation
-

7. Dynamics of Rotational Systems

- **7.1:** Dynamics of Rotating Discs and Cylinders
 - **7.2:** Gyroscopic Effects and Precession
 - **7.3:** Rotational Stability and Toppling
 - **7.4:** Applications in Engineering: Flywheels and Gears
-

8. Vibrational Dynamics

- **8.1:** Introduction to Vibrations
 - Free and Damped Vibrations
 - **8.2:** Simple Harmonic Motion (SHM)
 - **8.3:** Forced Vibrations and Resonance
 - **8.4:** Vibrational Analysis in Structures and Machines
-

9. Dynamics in Non-Inertial Frames

- **9.1:** Pseudo Forces: Centrifugal and Coriolis Forces
 - **9.2:** Dynamics in Rotating Reference Frames
 - **9.3:** Applications in Earth's Dynamics: Foucault's Pendulum
 - **9.4:** Engineering Applications in Rotating Machinery
-

10. Analytical Dynamics

- **10.1:** Introduction to Analytical Methods
 - **10.2:** D'Alembert's Principle and Virtual Work
 - **10.3:** Lagrangian Mechanics
 - Generalized Coordinates and Constraints
 - Applications to Particle and Rigid Body Dynamics
 - **10.4:** Hamiltonian Mechanics
-

11. Orbital Mechanics and Celestial Dynamics

- **11.1:** Laws of Planetary Motion (Kepler's Laws)
 - **11.2:** Newton's Law of Gravitation and Orbital Dynamics
 - **11.3:** Escape Velocity and Orbital Energy
 - **11.4:** Applications: Satellites and Spacecraft Dynamics
-

12. Fluid Dynamics

- **12.1:** Introduction to Fluid Dynamics
 - Properties of Fluids in Motion
 - **12.2:** Continuity Equation and Bernoulli's Principle
 - **12.3:** Navier-Stokes Equations and Applications
 - **12.4:** Dynamics of Turbulence
-

13. Dynamics of Energy Systems

- **13.1:** Power, Efficiency, and Losses in Mechanical Systems
 - **13.2:** Dynamics of Wind and Water Turbines
 - **13.3:** Energy Harvesting from Vibrations
 - **13.4:** Applications in Renewable Energy Systems
-

14. Computational Dynamics

- **14.1:** Numerical Methods in Dynamics
 - Finite Element Analysis (FEA)
 - Computational Fluid Dynamics (CFD)
 - **14.2:** Simulations of Particle and Rigid Body Dynamics
 - **14.3:** Optimization in Dynamic Systems
 - **14.4:** Software Tools: MATLAB, ANSYS, and OpenFOAM
-

15. Advanced Topics in Dynamics

- **15.1:** Chaotic Motion and Nonlinear Dynamics
 - **15.2:** Relativistic Dynamics: High-Speed Systems
 - **15.3:** Quantum Dynamics and Wave-Particle Interactions
 - **15.4:** Dynamics of Nanomechanical Systems
-

16. Applications of Dynamics in Engineering

- **16.1:** Dynamics in Robotics and Automation
 - **16.2:** Automotive and Aerospace Dynamics
 - **16.3:** Structural Dynamics in Buildings and Bridges
 - **16.4:** Biomechanics and Human Motion Analysis
-

17. Challenges and Future Directions

- **17.1:** Dynamic Systems in Extreme Environments
- **17.2:** Energy-Efficient Dynamic Systems
- **17.3:** Dynamics in AI and Machine Learning Applications
- **17.4:** Open Questions in Advanced Dynamics

Appendices

- **A.1:** Mathematical Foundations for Dynamics
 - Differential Equations, Vector Calculus, and Linear Algebra
- **A.2:** Experimental Techniques in Dynamics
- **A.3:** Glossary of Terms in Dynamics
- **A.4:** Reference Tables for Physical Constants and Material Properties

2. *Research papers published in Refereed/Peer Reviewed Journals*

a) *Research papers published in Academic Journals other than Refereed/Peer Reviewed Journals*

b) *Research papers published in Refereed/Peer Reviewed Conferences*

17

1. Potential Barrier Hindering Angular Motion And Off – Centre Displacement of OH In LiF,CsBr, AgCl and NaI lattices- DR. Pankaj Kumar Singh-Bulletin of Pure And Applied Sciences Vol.19 (no.1) 200P.1050109
2. A Non-linear Impurity In Two Demensional Systems- Asian Journal Of Physics, Vol.10 No.3(2020)375-378- DR. Pankaj Kumar Singh
3. Mechanoluminescence and Deformation Bleaching in Coloured Alkali Halides Crystals- DR. Pankaj Kumar Singh - Asian Journal Of Chemistry, Vol.13 No.3(2019), 867-875
4. Study of Repulsive Interaction In Ionic Crystals- DR. Pankaj Kumar Singh - Asian Journal of Chemistry, Vol.13No.3(2019), 1249-1298.
5. Study Of Potential for Modelling BCC Metals-Acta Ciencia Indica, vol.XXVII P.No.2, 107(2019)- DR. Pankaj Kumar Singh.
6. Study Of Photoradical Ageing Of Polymers Acta Ciencia Indica, Vol.XXVII P.No.3, 195(2020)- Kukmari Anita, DR. Pankaj Kumar Singh.
7. Study Of Nuclear Spin Conservation In Ammonium Alkali Halide Crystals Asian Journal Of Chemistry, Vol.14No.3-4(2019)1804-1806- DR. Pankaj Kumar Singh
8. X-ray Study Of The Mean Debye-Waller Factor Amplitude Of Vibration And Debye Temperatures With CsCl Structures- DR. Pankaj Kumar Singh - Oriental Journal Of Chemistry, Bhopal, Vol.18(1)P.69-72(2020)
9. Analytical Study Of Ion Implantation And Laser Treatment of GaAs- DR. Pankaj Kumar Singh, Nishikant and Ravindra Kumar-Oriental Journal of Chemistry, Bhopal, Vol.18(1)P.97-100(2018)
10. Effective Force Constant Charges Arojund Impurities klln Ionic Crystals-Oriental Journal Of Chemistry, Bhopal Vol.18(3)P.495-500(2017)- DR. Pankaj Kumar Singh
11. Estimation of Electronic Structural And Vibrational Properties of Alkali Halides-Oriental Journal of Chemistry, Bhopal Vol.18(3) P.495-500(2017)- Pankaj Kumar Singh
12. A Comparative Study of Band Structure Energy of Li,Na & k Liquid Alkali Metals-Rajeev Narayan Prasad and Pankaj Kumar Singh -Material Science research India, Vol01 No.(1)69-72(2019).
13. Photo Physical and Photo Chemicl Properties of Dye Molecules used for fluorescent Solar Concentrators- Pankaj Kumar Singh, Arun Kumar Singh, Raavindra Kumar, Umesh Kumar Sinha, Sangeeta Kuamri, Vibha Singha, Rajev Narayan Prasad and Acta Cienca Indica Vol.XXIX P. No.2,

<p>171(2016).</p> <p>14. 14.A Comparative Study Of Brittleness Of Polymer and Ceramic- Pankaj Kumar Singh, Kumrai Anit, Nishi Kant, Ravindra Kumar, Aslam Ali Ansari- Acataa Cienca Indica Vol. XXIX P. No.2, 185(2015)</p> <p>15. Study Of Electronic Structure Of Cu/Mn- H. K. Jha, B.P.Yadav, B. D.Chaudhary, Amar Nath Roy, Adaarsh Kuamr, Pankaj Kumar Singh -Chemistry:An Indian Jorunal of Chemistry, Vol.18(10,97-100(2015).</p> <p>16. Analysis of Stability and Ground-State Properties of KCl:ag- Pankaj Kumar Singh -Oriental Journal Of Chemistry, Bhopal Vol.19(1)P.131-134(2014).</p> <p>17. Analllysis of Excited States ofAg-Centres In Alkali Halides- Pankaj Kumar Singh -Asian Journal of Chemistry, Vol.18 No.1(2015), 1-7</p> <p>c) <i>Research papers Published in Conferences/Seminar other than Refereed/Peer Reviewed Conferences</i></p> <p>10</p> <p>3. <i>Other publications (Edited works, Book reviews, Festschrift volumes, etc.)</i></p> <p>05</p>
Conference Organization/Presentations
<p><i>List against each head(If applicable)</i></p> <p>1. <i>Organization of a Conference</i></p> <p>2. <i>Participation as Paper/Poster Presenter</i></p> <p>12</p>
Research Projects (Major Grants/Research Collaboration)
NO
Awards and Distinctions
03
Association With Professional Bodies
<ul style="list-style-type: none"> • <i>Editing</i> -No • <i>Reviewing</i> -No • <i>Advisory</i> -01 • <i>Committees and Boards</i> -01 • <i>Memberships</i> -03 • <i>Office Bearer</i> -02
Corporate Life
Other Activities

Signature of Faculty Member

- You are also requested to give your complete resume as a Word or PDF file to be attached as a link on your department page.