



**NIT RAIPUR**  
**COLLABORATION**  
**2020**



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## *Director's Message*

It is a matter of immense pleasure that NIT Raipur is publishing a booklet on “Collaboration”.

Industry and Institute collaborations and linkages are a must for sustainable growth of technology, economy and human civilization. NIT Raipur is sincerely working for symbiotic relationship with industries since its inception in 1956.

Institute-Industry Interaction is an essential prerequisite to train, develop and release the right kind of technical manpower necessary to sustain and promote industrial and economic growth. Collaborative partnerships between industry and academia create new value and contribute to the creation of a more prosperous nation. The partnership forms an important activity with the objective of developing close relations by means of interaction programs, interacting in domains of research for conducting collaborations, offering research and consultancy to the industries, jointly organizing seminars, symposiums and workshops, training of industrial personnel on-site, on-campus or both, inviting Industry experts for lectures and interactions with the students and jointly developing collaborative infrastructure gradually.

I appreciate the efforts of the National & Industrial Collaboration Cell for this herculean task of encompassing the strengths of our prestigious institution and extend my best wishes to the members for their endeavours' towards excellence.

I believe that the readers will find this booklet remarkable and gain acquaintance with the strengths of NIT Raipur.

**Dr. A. M. Rawani**  
**Director**  
**NIT Raipur**



## *Chairperson NICC's Message*

With the advent of globalization and opening of Indian economy, competition among industries has become neck to neck. In order to solve their engineering problems, they now look up to technical institutions. Similarly, there is an urgent need to prepare engineering students for jobs in multinational companies, by equipping them to newer technologies. These can only be achieved well by bridging the gap between industry and the academic institutions. Better interaction between technical institutions and industry is the need of the hour. This will have great bearing on the engineering curriculum, exposure of engineering students to industrial environment and subsequent placement of new graduating engineers in industries across the country.

Industries and institutes have been collaborating since a long time, but the sudden rise of a global knowledge economy has intensified the need for strategic partnerships. Although the technical Institutes are already imparting the basic knowledge and skill to the students, this Industry-Institute interaction will enable to undertake research projects by staff and students relevant to the industry. The Industry-Institute interaction needs to be designed to run for a longer period for preparing the manpower of world class in the field of science and technology by inculcating the various skills required by the industry, thereby contributing to the economic and social development at large.

In order to develop the "Make in India" program, more manpower has to be deployed in order to ensure the required development. Though availability of manpower is abundant in India, well equipped manpower with employability skills is the need of the hour. There is a need to create avenues for a closer academia and industry interaction through all the phases of technology development, starting from conceptualizing to commercialization.

NIT Raipur has crafted a unique Industry-Institution interaction initiative as one of its core pillars through the formation of National and Industrial Collaboration Cell (NIC Cell) under the mentorship of Honourable Director. This initiative shall go a long way to fulfill the needs of globalization. The NIC cell is publishing a booklet on "Collaboration- 2020" for reflecting "Strength of the Institute". I am sure that this booklet will help in developing expertise and competency to offer better services to the Indian Industry. Here's wishing this unique venture a huge success.

**Dr. S. L. Sinha**  
**Chairperson,**  
**National and Industrial Collaboration Cell**  
**NIT, Raipur**

## ABOUT NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR, NIC CELL

National Institute of Technology Raipur (Formerly Government Engineering College Raipur), situated in the capital of state of Chhattisgarh, has proven to be 'Avant-grade' in the field of science and technology over past six decades in this region. With sweet memory of foundation ceremony by our president Hon'ble Dr. Rajendra Prasad on 14th September 1956, the Institute started with two departments namely Metallurgical and Mining Engineering. Later the inauguration of the Institute building was done by Prime Minister Hon'ble Pt. Jawahar Lal Nehru on 14th March 1963. From 1st December 2005, the Institute has become the National Institute of Technology, an Institute of National Importance.

Located centrally, with good connectivity from all parts of the state and country, NIT Raipur has all the key ingredients to promote and contribute towards the socio-economic growth of the central part of India. Of the major strengths, the one that needs mention foremost is the availability of resources in form of technically strong and qualified faculty along with state of art infrastructure in abundance. The Institute is committed to the challenging task of development of technical education by preparing seasoned graduates in highly sophisticated field of engineering and technology. The Institute is contributing to the technological, industrial and economic development of the region and the country and has been recognized for its role in engineering education, generation and dissemination of useful and relevant technologies in the service of the society.

### VISION

To be a leader in technical and management education in India and to establish a unique identity for the development of high-quality human and knowledge resource in diverse area of technology and management.

### MISSION

To re-engineer the engineering education and to mold young students into rational thinking engineers who are motivated by a passion for professional excellence driven by human values and proactively engaged in betterment of society.

### NATIONAL AND INDUSTRIAL COLLABORATION CELL (NICC)

The NIC cell has been developed for establishing strong bonding between Industry and Institute.

**The composition of the cell is given below:**

| Faculty from Institute  | Special Invitees from Industry   |
|---|--|
| <b>Dr. S. L. Sinha,</b><br>Prof. Department of Mechanical Engineering,<br>(Chairman)  | <b>Mr. Daya Sharma,</b><br>DGM, HR, NTPC Raipur +919425222158,<br><a href="mailto:dayasharma@ntpc.co.in">dayasharma@ntpc.co.in</a>                                 |
| <b>Dr. Manoj Kumar Chopkar,</b><br>Member, Asso. Professor, Metallurgical<br>Engineering, +918109939981<br><a href="mailto:mchopkar.met@nitrr.ac.in">mchopkar.met@nitrr.ac.in</a> | <b>Mr. Arvind Bhaghel,</b><br>Associate Vice President, JSPL, Raigarh<br>+919827477150, <a href="mailto:arvind0106bhagat@gmail.com">arvind0106bhagat@gmail.com</a> |
| <b>Dr. Kavita Tapadia,</b><br>Member, Asso. Professor, Department of<br>Chemistry 9977987702<br><a href="mailto:ktapadia.chy@nitrr.ac.in">ktapadia.chy@nitrr.ac.in</a>            | <b>Ms. Nidhi Pandey Badmera,</b><br>Senior Technical Executive, SEML, Raipur<br>+919669510008, <a href="mailto:nidhi.o.i@gmail.com">nidhi.o.i@gmail.com</a>        |
| <b>Dr. N V Swamy Naidu,</b><br>Member, Asso. Professor, Mechanical<br>Engineering,  |  |



**DEPARTMENT'S -  
COMPETENCIES  
AND  
ACHIEVEMENTS**

## DEPARTMENT OF APPLIED GEOLOGY

The Department of Applied Geology came into existence in the year 1961 with the prime aim of preparing the post-graduates students (M. Tech. Degree) for the future needs as Geologists / Earth Scientists to a number of Central, State, Public and Private Organizations. The Department has significant role in carrying out testing and consultancy projects for over four decades and now expects to play a major role in the development of mineral rich Chhattisgarh State, as far as Geological, Geophysical, Mining, Mineral and Natural Resource Management are concerned. Besides, the Department also offers Ph. D. Degree in various disciplines of Geology. It is highly remarkable that the alumni of this department are occupying key positions in leading organizations of the country.

### 1. Area of Expertise:

Structural Geological Mapping and Field Geology, Mineralogy, Petrology, Engineering Geology, Hydrogeology, Remote Sensing and GIS and, Mineral Exploration.

### 2. Research Projects:

1. Consultancy Project Completed-Preparation of drainage pattern of industries linked to Ganga River basin and reporting the status of pollution from the industries for Chhattisgarh Environment Conservation Board/ 24.71 Lacs.
2. Water audit and groundwater harvesting system study for Swami Vivekanand Airport, Raipur, Airport Authority of India/ 05 Lacs.
3. Identification of Potential Groundwater Artificial Recharge Zones for Rainwater Harvesting in Raipur Municipal corporation and Naya Raipur Area, Chhattisgarh / CGCOST, Govt. of Chhattisgarh / Rs. 5.00 Lakhs.
4. Identification, Mapping and Spectral Library Generation for Hydrothermally Altered, Weathered and Clay Minerals / ISRO, Govt. of India / Rs. 19.50 Lakhs.
5. Utilization of Dual Frequency Polarimetric SAR Data for Scattering based Sub-Surface Geological and Linear Feature Characterization / ISRO, Govt. of India / Rs. 18.51 Lakhs.
6. Lithological / Mineralogical Mapping of Different Minerals Through Different Indices/ Ratioing Techniques Using Remote Sensing Data / NIT Raipur Seed Grant / Rs. 5.00 Lakhs.
7. Consultancy project of preparation of Geological Report and Pre-feasibility Report of Prospecting Operation for Iron Ores carrying out at Dantewada District / Jindal Steel & Power Limited, Raipur, Rs. 11.80 Lakhs.

### 3. List of Agencies to whom Department has provided the Testing and Consultancy:

- Ø Jindal Steel and Power Limited, Raipur (C.G.)
- Ø Larsen and Toubro Ltd. Raipur (C.G.)
- Ø Kangaroo Minerals Ltd. TANZANIA

- Ø M.K.S. Minerals & Marbles, MANDLA (M.P.)
- Ø Mahendra Sponge & Power Ltd. RAIPUR (C.G.)
- Ø HIRA, Godawari Power & Ispat Ltd. RAIPUR (C.G.)
- Ø Arti Infrastructure and Buildcon Limited, RAIPUR (C.G.)
- Ø Dee Vee Project Ltd. Korba (C.G.)
- Ø Godawari Power & Ispat Limited, Raipur (C.G.)
- Ø Pilliwar & Associate, Raipur (C.G.)
- Ø Airport Authority of India, Raipur (C.G.)
- Ø Siddharth Geo Consultant (India) Pvt. Ltd., Raipur (C.G.)
- Ø Build Earth Sand LLP, HOSPET, Karnataka
  
- Ø Chhattisgarh Environment Conservation Board

4. **Testing Facilities available in the Department:**

- Ø Facilities for preparation of thin and polished sections of Rocks and Ores
- Ø Advanced Microscopes with camera facility for Petrographic analysis of Rocks and Ores.
- Ø Advanced Stereozoom Microscope with Photographic facility
- Ø Instruments related to Hydrogeological Investigation / Soil Resistivity Survey
- Ø Instruments for Groundwater Quality Analysis
- Ø Application of Remote Sensing and GIS in Hydrological Studies and Mineral Exploration
- Ø Digital Schmidt Hammer
- Ø Unmanned Aerial Vehicle
- Ø Field Equipment Kit i.e. Brunton Compass, Geological Hammers, Global Positioning System (GPS)
- Ø Software (ArcGIS, Erdas Imagine, Aqua-Chem, WinRock, RockWorks and Surfer etc.) and Satellite data.
- Ø Hydrogeological study for mining/ industrial areas
- Ø Artificial recharge/ rainwater harvesting study
- Ø Water quality analysis
- Ø Groundwater development and management study
- Ø Specific Gravity Measurement Kit





## DEPARTMENT OF ARCHITECTURE

The Department of Architecture has been emerged as a full-fledged department in the spring of 1984 of erstwhile Government Engineering College Raipur, with an intake of twenty students. The department also offers PhDs in the field of Architecture since 2010. At present department comprises one professor, two associate professors and eight assistant professors. Most of the faculty members are from IITs, NITs and SPAs (Institute of National Importance).

### 1. Area of Expertise:

History of Architecture, Town Planning, Space Syntax Analysis, Architectural Conservation, Intelligent Super tall Buildings, Energy Efficient Housing, Industrialised Mass Housing, Indoor Air Quality, Climatology, Environmental Planning, Vernacular Architecture, Sustainable Settlements, Climatology, Shell Structure, Energy Efficient Architecture, Solar Passive Architecture, Environmental Planning & Management, Town Planning, Environmental Planning, Graphics, Housing, Urban Renewal, Sustainable Architecture, Energy simulations studies, Space Syntax, Social studies in Architecture, Architectural Design, Rural growth and Architecture, Architectural history, Environmental Planning, Graphics, Climatology, Sustainable Architecture, Transportation and Infrastructure planning, Building services, Architectural design, Urban & Transportation Planning, Urban Management & Finance, Building Constructions, Building Services and Land Use-Transportation Interaction and Industrial.

### 2. Research Projects:

1. Assessment of Thermal Conditions in EWS Monolithic Houses Being Constructed Under PMAY/ HFA Scheme AT Naya Raipur/ Bhilai/ Durg (C.G.), Funding amount - Rs. 90,000/-, Funding Agency - BSBK Pvt. Ltd.
2. Rural Spatial Study of Gram Panchayat of Jhit, Dist- Durg (C.G.) and Udaipur, Dist- Sarguja (C.G.), Funding amount Rs. 5,00,000/-, Funding Agency - Ministry of Panchayati Raj, Government of India



## DEPARTEMNT OF BIOMEDICAL ENGINEERING

The Department of Biomedical Engineering came into existence in the year 2003. The primary aim of the department is to provide the society with world-class competitive professionals in the field of Biomedical Engineering. The faculty and graduates, a driving force in creating engineering knowledge and novel Biomedical Technology that improve the human condition through advancement of health care and Biomedical Sciences, among the top most in India.

The department enables the students to understand the human body as an integrated system through quantitative engineering analysis and to use that understanding to design better therapeutic strategies, devices, and diagnostics. A mission of nearly equal importance is to serve society by conducting research that develops quantitative linkages across scales in the human body and uses that development to build new tools to improve human health. It also includes the following points:

- Institute-Industries collaborative activities on real life problem-solution approach.
- Serve our wider constituencies by offering our expertise to other health-related professionals, industries, state and local communities.
- Building excellent infrastructure for cutting-edge technology research in Health care science.
- Collaborative research with Pioneers of Biomedical Engineering Societies across the Globe.
- Built some specialized Centre of Excellence for conducting research on Future Health Care Sciences and Technologies.

The degrees offered by the department include B.Tech (Bachelor of Technology) and Ph.D. (Doctor of Philosophy in BME).

### 1. Area of Expertise:

Includes Biochemistry/Enzyme Technology, Biosensor development for clinical application, Biomedical Signal Processing, Medical Imaging, Information Retrieval, Soft computing, Pattern recognition, Brain Functioning Analysis, Machine Learning, Lung Sound Analysis, Speech Signal Processing for medical applications, Multi-modal imaging, Clinical microfluidics, biomechanics, Tissue Engineering, Computational Fluid Dynamics, Signal Processing, Image processing, Photoplethysmogram, Process of Designing Medical technologies, Emerging Technologies in Healthcare, Medical Imaging, Computational & Multiscale Biomechanics, Orthopedic & Dental Implant Biomechanics, Finite Element Analysis.

### 2. Research Projects :

1. Dr. Bikesh Kumar Singh, Computer aided technique for diseases diagnosis: A non-invasive approach of disease detection using IRIS image of 2.87 Lakhs, sponsored by CCOST.
2. Dr. Bikesh Kumar Singh, Computer aided analysis and interpretation of mammographic images for early diagnosis of breast cancer in Chhattisgarh of 3.60 Lakhs, sponsored by CCOST.
3. Dr. Bikesh Kumar Singh, Development of a risk stratification system for clinical management of sickle cell disease using predictive machine learning approaches, of 16.1 Lakhs, sponsored by SERB, Govt. of India.
4. Dr. Arindam Bit, Early Career Award: On-chip development of three-dimensional clinical graded tissue graft for the treatment of diseased esophageal segment with integration of vascularization,

and enhanced neurogenesis of Rs. 33,18,500, sponsored by Department of Science and Technology, India, (2017-2020).

5. Dr. Arindam Bit, Indo Russian Mega Grant: Regeneration mechanisms of deep-layer skin wounds in response to treatment with polyelectrolyte-hydrogel complex dressings and gene therapy of Rs. 29,50,000 and 3000,000 roubles, sponsored by Department of Science and Technology, India, and Russian Science Foundation, Russia, (2019-2021).
6. Dr. Arindam Bit, Technology Development Program - DST: Development of Microfluidic platform for point-of care diagnosis of sickle cell anemia of Chhattisgarh of Rs. 28,00,000 (in addition to Rs. 29,00,000 sponsored by Samplytics Pvt Limited, India), sponsored by Department of Science and Technology, India, (2019-2021).
7. Dr. Arindam Bit, Scheme for Promotion of Academic and Research Collaboration- MHRD India: Development of complete functional blood vessel network on multi-layered microfluidic platform of Rs. 53, 20,000, sponsored by Ministry of Human Resource Development, Govt. Of India, (2019-2021).
8. Dr. Saurabh Gupta, Three-dimensional Monte-Carlo Simulations for Photoacoustic Tomography using Graphics Processing Units of Rs. 20, 19,330, sponsored by DST SERB

### **3. LAB FACILITIES**

Labs are well equipped with various testing facilities (Bio recorders) which include:

1. 16 channel Bio-signal data acquisition system (AD Instrument) for: ECG, PPG, EEG, EMG, Force, Respiration etc.
2. 4 channel Bio-signal recorder (Biopacinc.) for: ECG, EMG, Pulse
3. 16 channel FNIRS Brain Imaging system
4. Wireless EMG system for EMG recording
5. Littmann Electronic Stethoscope for Lung and Heart Sounds recording
6. PCB prototype machine (NVIS72)
7. 32 channel EEG recorder
8. Digital Blood Pressure measurement device
9. 3-D printing of polymeric materials
10. 3D designing and subsequent polymeric printing
11. Designing of customized implant
12. Analysis of designed implant
13. Polymeric thin film production
14. Powder formation of liquid samples / solvents
15. Z 840 Workstation for Deep Learning/ AI applications

### **4. LAB DETAILS**

Biomedical Equipment Lab: 8 MHz Portable Ultrasound(USG) Machine(A scan and B scan), Ultrasound based CT Scan Trainer Kit, Electrosurgical trainer , Multi-parameter monitoring system(Bedside), Hemo dialyser trainer unit ,EEG and EMG trainer kit.

**Biomedical Transducer Instrumentation Lab:** Active and passive components, Transducer and sensors, NI ELVIS Biomedical LAB, NI LabView Hardware platform for Design and Prototyping, Digital Oscilloscopes, Signal Generators, pulse oximeter, BP sensor, oxygen sensor, PPG sensor.

**Anatomy and Physiology Lab:** Blood Cell Counter, Heart Rate monitor, Blood pressure monitor, Respiration rate monitor, ECG Simulator, Haemo cytometer, Haemo-meter, pH electrode.

**Biomedical Signal and Image Processing Lab:** LabView software, National Instrument High Speed DAQ card, Biopac MP 36 (Four Channel Data Acquisition) system.

**Microprocessor and Microcontroller Lab:** Basic Trainer Kits for Microprocessor and Microcontroller, Basic Trainer Kit for Interfacing Modules of Microprocessor and Microcontroller.

**Analog and Digital Electronics Lab:** Basic Trainer Kits for Analog Electronics and Digital Electronics, Trainer kits for Communication Lab.



## DEPARTMENT OF BIOTECHNOLOGY

The Department of Biotechnology was set up in the year 2003. The Department is one of the research-oriented departments. It has been offering academic programs in B.Tech and Ph.D. degrees and provides research insights to Ph.D scholars in all frontline areas of Biotechnology including: Enzyme technology, Bio sensing devices, drug discovery, advanced bio processing etc. Presently, the department is running various research projects sponsored by DST and DBT, Government of India.

**1. Field of Expertise:** Basic and Applied Microbiology/Biofuel, Biopolymer development, Biochemistry/Enzyme Technology, Biosensor development and alternative energy production, Infectious and Metabolic Disease, Modelling, Optimization & Control of Biochemical process, Bioinformatics and drug design, Bio process Engineering, Environmental Biotechnology, Biocatalyst & Bio-products.

### 2. Research Projects

1. Design of Microbial Fuel Cell Integrated Microbial Electrolytic Cell Reactor and Study of its Structural and Process Parameter for Economics Production of Bio- Hydrogen by Electrohydrogenesis. Amount: 23,42,004.00 (DBT, Govt. of India)
2. To Explore Morphological Changes in Pathogenic Fungal Growth Before/ After Application of Potent Antifungal Amount: 8,00,000.00 (DBT, Govt. of India)
3. Experimental, Mathematical and Kinetic Modeling of Microbial Fuel Cell Process from the Waste Water. Amount: 42,94,800.00 (DST-SERB)
4. Farbrication of Hemo- Filtration System Using Novel Ceramic Membrance to Develop a Portable Artificial Kidney, Amount: 26,88,800.00 (DST-SERB)
5. Vibratory Shear Enhanced Filtration Process for Separation of Nanoparticles Synthesized by Microorganism Using Nanofiltration Flat Membrane, Amount : 26,79,000.00 (DST-SERB)

### 3. Testing facilities available in the department

- i. High Performance Liquid Chromatography
- ii. Software: Schrodinger Glide and Prime



## DEPARTMENT OF CHEMICAL ENGINEERING

The department of Chemical Engineering came into existence in the year 1962 under the aegis of Government College of Engineering and Technology, Raipur (now National Institute of Technology Raipur, Raipur). The Department is offering undergraduate course (B.Tech in Chemical engineering) and one post-graduate course (M.Tech in Chemical Engineering). UG course (B.Tech in Chemical Engineering) was accredited by NBA for a period of 3 years till 30-06-2019.

1. **Area of Expertise:** Semifluidization, Waste Water Treatment, Bioprocess Engineering, Chemical Sensors, Food Technology, Catalysis, Environmental Biotechnology, Process Design, Reaction Engineering, Waste Water Treatment Heat Transfer, Petroleum Refining, Solvent Extraction, Pyrolysis, Environmental Pollution Membranes, Reactive Separation, CFD, Food Science Process Intensification (Reactive Separation, Extraction, SFE), Nanotechnology (Bio-nanocomposite, Nano fluids), Bio Resource Technology & Alternate Energy (Pyrolysis, Bio-fuels) Wastewater Treatment (Electrocoagulation), Advanced Oxidation Processes (AOPs) for removal of persistent organic pollutants, Industrial Waste Water Treatment Methods, Advance Separation Process (Adsorption, Membrane & Biological) and Nanocomposites, Microelectronic Fabrication (CMP), Nanotechnology, Electrochemistry, Electrochemistry, Solar Cell Material, Nanotechnology, Environmental Engineering, Industrial Pollution Abatement, Adsorption, Pervaporation, Modelling and Simulation, Process Design, Pinch Technology, Computational Fluid Dynamics, Fluid Dynamics, Mixing Process, Turbulence, Chemical Mechanical Planarization, Nanotechnology, Corrosion science, Adsorption.

### 2. **Research Projects:**

1. Kinetics of thermal degradation of chlorophyll green leafy vegetables and increasing the shelf life of the vegetables, Funding Agency- DST/SERB, Funded amount - 11,71,400/-
2. Intensification of downstream processing of citric acid using process intensification method (reactive extraction), Funding Agency- CGCOST, Funded amount - 2,00,000/-
3. Treatment of bio-digester effluents (BDE) of rice grain based industry, Funding Agency- CGCOST, Funded amount - 1,05,000/-
4. Combined novel biophysical treatment for heterogeneous wastewater pollutants, Funding Agency- SERB, Funded amount - 48,65,879/-
5. Electrochemical Deposition of CZTS for solar cell application, Funding Agency- DST-SERI, Funded amount - 27,44,000/-
6. Slurry formulation for ruthenium chemical mechanical planarization, Funding Agency- DST/SERB, Funded amount - 26,35,593/-
7. Practically-Viable heterogeneous Fenton catalyst and reuse of same catalyst in synthetic or industrial wastewater treatment, Funding Agency- SERB, Funded amount - 25,89,000/-
8. Synthesis of nano coated ceramic composite membrane for separation of green chemicals from technical lignin, Funding Agency- SERB, Funded amount - 25,35,500/-

9. Studies on a membrane reactor for the etherification of mono-carboxylic acids with ethanol, Funding Agency- DST/SERB, Funded amount - 25,20,000/-
10. One step CZTS nano ink synthesis by sonochemical route for bifacial solar cell application, Funding Agency- DST-SERB, Funded amount - 23,46,000/-
11. Shelf life of spices, Funding Agency- CGCOST, Funded amount - 5,00,000/-
12. Organic acids from sugarcane industry's byproduct, Funding Agency- CGCOST, Funded amount - 5,00,000/-
13. Interactive mechanism of green corrosion inhibitor and mild steel in alkaline medium containing chloride ion, Funding Agency- CGCOST, Funded amount - 4,28,000/-
14. Removal of dye and reduction of COD from dye bearing effluent, Funding Agency- CGCOST, Funded amount - 4,00,000/-
15. Effect of additives on germanium chemical mechanical planarization slurries, Funding Agency- IEI, Funded amount - 50,000/-.

### 3. Testing facilities available in the department:

1. Analytical Instrument: The following instruments are in our department for analysis of samples.
2. HPLC, FTIR, Rheometer, Gas Chromatography, Particle Size analyzer (up to 0.02 micron), Atomic Absorption Spectroscopy, flame photometer, Contact Angle Analyzer, Open circuit potential (Max. 30 min), Potentiodynamic polarization study/Tafel study, Electrochemical impedance spectroscopy study, Cyclic voltammetry, Linear sweep voltammetry, Refractometer, UV-visible spectrophotometer.
3. Product testing facilities: The following product testing facilities are available in our department.
4. Plywood & Pre-laminated Board: Density, Moisture content, Resistance to dry heat, Fire resistance, Flammability test, Flame penetration test, Rate of burning test, Water resistant test, pH Value, Acidity and alkalinity resistance test, Formaldehyde Emission (Perforated Method), Mycological test
5. Shutters & Doors: Knife test, End immersion test
6. Cement, Clay, Ash, Minerals, Refractory Materials & Ore etc.: Bulk Density, Specific Gravity, Setting Time (for cement only), Chemical Analysis of Cement for the constituents-LOI, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, CaO, MgO, Chemical Analysis of Cement for each Additional Components like IR, SO<sub>3</sub>, Na<sub>2</sub>O, K<sub>2</sub>O, Chloride, etc.
7. Coal: Moisture (Oven drying), Free Moisture, Ash, Full Proximate Analysis, Volatile Matter, Methylene Blue Number, Iodine Absorption Value.



## DEPARTMENT OF CHEMISTRY

The Department of Chemistry has been functioning since inception of engineering college i.e 1956. The department provides an outstanding research environment and offers academic programs leading to the award of Ph.D. degree. Apart from this, Department takes care of all I year B.Tech branches and providing instruction in basic fundamentals of Applied Chemistry, Environment & Ecology, Physical & Organic Chemistry (IV Sem) and Geochemistry practical (M.Tech).

1. Area of Expertise: Organic Chemistry / Analytical Chemistry, Nuclear Chemistry, Environmental Chemistry, Nanotechnology & Luminescence/ Drug designing & DNA binding, Environmental Analytical Chemistry and water quality analysis, Synthesis of nanoparticles and its application in Various Field, Micro-extraction and Pharmacokinetic study of Drugs, Synthesis and characterization of nano-material, Polymer nano composite & micro cellular composite, Environmental Chemistry and water quality analysis, Carbon dioxide sequestration, Biodegradable Polymers, Drug design of pharmaceutical importance, Synthesis of bioactive heterocyclic compounds, Crystal Engineering, Hydrogen Bonding-Applicable to solve the solubility and stability issues in organic and metallo-drugs.

### 2. Research Projects:

1. Dr. (Mrs.) F. Khan, Oxalohydroxamic acid is used as a partitioning agent in PUREX process of nuclear fuel reprocessing, Funding Agency- CCOST, Funded amount - 1.82 Lacs, Year- 2012.
2. Dr. K. Tapadia, Microextraction Analysis of toxicants in environmental and biological sample, Funding Agency- CCOST, Funded amount - 1.84 Lacs, Year- 2012 to 2014.
3. Dr. K. Tapadia, Analytical studies of fluoride concentration and its removal from groundwater of Bastar region, India, Funding Agency- WSSO, PHED, (for three years), Funded amount - 18.50 Lacs, Year- 31-03-2014 to 31-03-2017.
4. Dr. K. Tapadia & **Co-PI:** Dr T. Maharana, Spatial distribution of uranium and associated water quality parameters in groundwater / drinking water of six districts (Narayanpur, Kondagaon, Bijapur, Dantawada, Bastar, Sukma) of Chhattisgarh, Funding Agency- BRNS, Funded amount - 20.04300 lakhs, Year- 29/03/2016 to 2018.
5. Dr. K. Tapadia (As Co-PI), Chemical and Enzymatic modification of NSAID to overcome their side effect, Funding Agency- CGCOST , Funded amount - 2.00 Lacs, Year- 2012 to 2014.
6. Dr. S. P. Mahapatra, Preparation and Characterization of Microcellular Elastomer Nanocomposites for Packaging and Semi-conducting Applications, Funding Agency- CGCOST.
7. Dr. S. P. Mahapatra and Dr. Santhosh Penta, Feasibility studies on removal of contaminants from surface and ground water of Bailadila iron ore mine project & peripherals, Funding Agency- NMDC, Govt. Of India, Funded amount - 66.59 Lacs, Year- 2018 to 2021.
8. Dr. T. Maharana & **Co-PI:** Dr A.K. Sutar, Synthesis and Characterizations of [O,N,N,O] Based Bulky Schiff Base Metal Complexes: Efficient Initiators for the Ring-Opening Polymerization of Lactide, Funding Agency- CSIR, Funded amount - 17L, Year- 2012 to 2015.



9. Dr. A.K. Sutar & **Co-PI** : Dr T Maharana, Highly efficient metal initiators based on tridentate or tetradentate bulky Schiff base ligands for thering opening polymerization of lactide, Funding Agency- UGC, Funded amount - 10.69L, Year- 2012 & 2015
10. Dr. T. Maharana, Synthesis and Characterizations of [O-,N,N,O] Based Bulky Schiff Base Metal Complexes and Their Catalytic Activity Towards Cyclic Carbonate Formation by Fixation of CO<sub>2</sub>, Funding Agency- DST, Funded amount - 24.5L, Year- 2014 & 2017.
11. Dr. A.K. Sutar & **Co-PI**: Dr T Maharana, Synthesis and Characterizations of Polymer Supported Based Bulky Schiff Base Metal Complexes and Their Catalytic Activity, Funding Agency- CSIR, Funded amount - 21L, Year- 2013 & 2016.
12. Dr. T. Maharana & **Co-PI**: Dr K Tapadia, Spatial distribution of uranium and associated water quality parameter in ground water / drinking water of five district (Bilaspur, Korba, Koriya, Mungeli & Surajpur), Funding Agency- BRNS, Funded amount - 26 L, Year- 2016 & 2018.
13. Dr. Santhosh Penta, Design and synthesis of novel potent heterocyclic compounds and their biological evaluation, Funding Agency- CGCOST, Funded amount - 4.95 L, Year- 2014-2017.
14. Dr. Santhosh Penta, Design and synthesis of biologically relevance fused heterocycles via C-H activation / Oxidative cyclization / Tandem processes, Funding Agency- DST-SERB, Funded amount - 25 L, Year- 2019-2021.
15. Dr. K.A. Siddiqui, A Supramolecular Synthron Approach for Magneto-Structural Analysis of Hydrogen Bonded Metal-Organic Coordination Network, Funding Agency- CSIR, Funded amount - 10.00L, Year- 2018-2021.
16. Dr. K.A. Siddiqui, Crystal Engineering and Supramolecular Synthron Approach for Assembly of Hydrogen Bonded metal Complexes, Funding Agency- DST-SERB, Funded amount - 17.88, Year- 2014-2017.

### 3. Testing facilities available in the Department:

| S. N. | Name of Testing equipment along with photograph/software/other facility | Description of Testing Task view                    | Amount to be paid to carry out particular test |
|-------|---|---|--|
| 1     | Uv-Visible Spectrophotometer  | Detection of metal ions                             | 1000/-per sample                               |
| 2     | FT-IR   | Detection of functional groups of organic compounds | 800/- per sample                               |
| 3     | Fluorescence Spectrophotometer  | Detection of fluorescent of organic substance       | 2000/-per sample                               |
| 4     | LCR Meter   | Permittivity, Conductivity and Impedence analysis   | 1000/-per sample                               |
| 5     | Fluorimetry   | Detection of Uranium ion in the sample              | 1000/-per sample                               |



## DEPARTMENT OF CIVIL ENGINEERING

Civil engineering is considered to be the backbone for all type of developments. The Department of Civil Engineering at NIT Raipur (erstwhile, Government college of Engineering and Technology) is producing high quality technical manpower; required by various industrial establishments, R&D organizations, Govt. & public establishments and academic institutions since 1958. Civil Engineering involves the application of scientific principles and knowledge of mathematics, theory of mechanics and application of computers to the planning, analysis, design and construction for all type of infrastructures.

The Department offers B Tech degree in Civil Engineering and M Tech degree in Civil Engineering with specializations in Water Resources Development & Irrigation Engineering and Structural Engineering. The Department has been offering Ph.D. program in various specializations. The Department also encourages its students to engage in extra-curricular and co-curricular activities, essential for development, nurturing of team spirit, and developing organizational skills. The faculty members of the department are involved in research and consultancy activities, and they continue to enjoy academic leader role in the country. Govt. of India has recognized Civil Engineering Department as State Technical Agency for implementation of its ambitious projects of Pradhan Mantri Gram Sadak Yojana (PMGSY) & National Rural Drinking Water Programme (NRDWP).

### 1. Area of Expertise:

Structural Engg / Mechanics of Solids, Mechanics of Composite Materials, Finite Element Modelling, Earthquake Engineering, Water Resources Engg / Fluid Mechanics, Hydrology, Water Resources Engg, Structural Engineering/Structural Engg., Non- linear Analysis, Finite Element Analysis, Earthquake Engineering, Soil-Structure interaction, Transportation systems, Rural Roads, Environmental Engineering/ Water, Wastewater Treatment, Environmental Management, Airpollution Monitoring & Modelling. Solid Waste Management, Structural Engg / Structural Engg. , inverse problem, System Identification, Structural Health Monitoring, Damage Detection, Computational Mechanics, Environmental Engineering / Air Pollution Monitoring, Water/Waste Water Treatment, Industrial Waste Treatment, Structural Engg/ Concrete Technology, Fly ash & Marginal Materials, Fibre reinforced concrete, High voiume.fly ash concrete, Geotechnical Engineering/ Soil structure interaction, Rock Engg. 9Geotech Engg. Slope stability, foundation Pavement materials, Water Resources Development & Irrigation Engg/ Stochastic Hydrology, Surface Water Resources, Application of Remote Sensing & GIS in Water resources, Rainfall – Runoff Modelling, Water Resources & Environmental Engg./ Fluid Mechanics water Resources Engineering urban water distribution system Hydrology optimization techniques, Structural Engg./Matrix analysis of structures, Wind Effect on high rise structures, Seismic Engineering, Structural Engg./ Waste management in cement and concrete construction. Characterization of raw materials of cement and concrete. Optimization in cement and concrete, Structural Engg./ Structural Dynamics seismic Base Isolation

Geotechnical Earthquake Engineering Earthquake protection of Buildings Structural Analysis of Buildings, Transportation Engineering & Planning/ Mechanistic-Empirical Pavement Design, Performance evaluation of pavements using NDT methods, Highway traffic, Geotechnical Engineering/ Soil stabilization, Geotechnical Engineering, Geoenvironmental Engineering, Ground Improvement Techniques, Constitutive Modeling, Geotechnical Engineering,.

## **2. Research Projects:**

1. Improving soft sub-grade for the construction of low volume roads using locally available marginal materials, Funding Agency- Chhattisgarh Council of Science & Technology Raipur, Funded amount - 2,00,000.00
2. Environmental performance assessment of major city of Chhattisgarh based on green city index, Funding Agency- Human Settlement Management Institute, Funded amount - 23,49,200.00
3. Study of flood on Mahanadi river, Funding Agency- Revenue & Disaster Management Dept., C.G. Govt, Funded amount - 5,00,000.00
4. Construction of low volume roads on soft subgrade soil improved by locally available marginal materials, Funding Agency- Human Settlement Management Institute, HUDCO, New Delhi, Funded amount - 25,00,000.00
5. Parametric study of eco- friendly concrete/ composite by partial replacement of sand and cement with locally available industrial by products, Funding Agency- Chhattisgarh Council of Science & Technology, Funded amount - 4,02,000.00
6. Monitoring of fluoride in underground water of Jagdalpur district of Chhattisgarh and its removal, Funding Agency- Chhattisgarh Council of Science & Technology, Funded amount - 3,29,000.00
7. Study of the pollutants released during open burning of municipal solid waste, Funding Agency- Chhattisgarh Environmental Conservation Board, Funded amount - 20,90,758.00
8. Performance evaluation of some selected PMGSY roads in the state of Chhattisgarh, Funding Agency- National Rural Roads Development Agency, Funded amount - 41,89,000.00
9. Digital change detection for better natural resources management., Funding Agency- Research Seed Grant Project, Funded amount - 5,00,000.00
10. 10, Design and Validation of existing bike based patient carrier transport system for remote areas of Chhattisgarh and proposing design of bike-trailer assembly , Funding Agency- United Nations Children's Fund , Funded amount - 10,00,000.00

## **3. Testing facilities available in the department:**

Department is well equipped with advance equipment and software's available in various laboratories.

**Software's:** AutoCAD, Bentley's Software package (STAAD Pro, STAAD Foundation, MX Road, MicroStation, Bridge Master, Water Gems, Storm CAD, etc.), ANSYS, SAP, NISA, ArcGIS, Visual Modflow, SMS, WMS, ERDAS Imagine, ADOPT etc.

**Equipments:** Universal Testing Machine, Plate Load test, Triaxial Test, Consolidation Test, Swell Pressure Apparatus, Los Angles, Devels, Impact, Ductility Test Machines, Hydraulic flume, Turbines, Differential

Global Position System (DGPS), Total Station, Non-Destructive Testing, Cyclic Triaxial, Universal Triaxial, Digital Direct Shear, UV Visible Spectrophotometer, Atomic Absorption Spectrophotometer, etc.

#### 4. Testing Facilities:

Test on physical and mechanical properties of building stone, test on cement concrete tiles (terrazzo or mosaic & other), tests on hollow cement concrete block, tests on timbers, testing of bricks, testing of building limes, testing of cement, testing of aggregates, test on bitumen and bituminous concrete, testing of concrete piles, test on water sample, test on sewage & industrial waste, test of shutters and doors, surveying, testing FRP sheets, test on soils, free swelling index, preparation of soil sample for triaxial test, plate load test, swelling pressure test, field cbr test, resilient modulus test, tensile strength test of geosynthetics/geogrid, puncture test of geosynthetics/geogrid, weight per meter length, diameter of deformed bars, bend test, rebound test, ultimate tensile strength test, percentage elongation test, rebound hammer test on concrete, ultrasonic pulse velocity, half-cell potentiometer, electrical resistivity, testing of rheological parameters, shrinkage of cementation material), testing of highway material, conduction of terrestrial survey, assessment planning & development of water resources, restoration of ponds & lakes etc.



## DEPARTMENT OF COMPUTER APPLICATIONS

The Department of Computer Applications is one of the pioneer department of the institution that offers Post Graduate Courses as Master of Computer Applications (MCA) and Research Program as Ph.D. in Computer Applications. The department of Computer Applications is one of the oldest department of the institute since its inception in 1988 with an initial intake of 30 students. Students are admitted to the MCA Program through all India national level entrance examination NIMCET (National Institutes Master of Computer Applications Entrance Test) conducted by any one of the participating Institutes. Presently the MCA Program is having an intake of 104 Seats.

The Ph.D. Program started in 2011. Admission to Ph.D. Program is on the basis all India national level entrance examination conducted by NIT Raipur followed by interview. As on date 4 Research Scholars have been awarded Ph.D. in Computer Applications.

The Objective of the course is to provide quality education in the field of computer applications in cooperating good theoretical foundation through high-quality teaching complemented by extensive practical training approach. This same objective with publication in reputed national / international journals and national / international conferences etc. and making research for the benefit of mankind is opted in the research program of computer applications. The alumni of this department are serving in India and abroad on top and reputed position in many organizations.

Presently the department is enriched with 12 faculty members, who poses vast industrial as well as academic experience actively involved in teaching, research and in deployment of Research & Development projects apart from institutional administrative work. The faculty members have significantly contributed towards scientific arena in form of standard publications in peer- reviewed journals and conferences. The department is also providing extensive industrial training and organizing expert lectures focusing on emerging technologies for the benefit of both student and faculty.

Apart from focusing on consistent and good academic performance, the department encourages participation in the co-curricular and extra-curricular activities among the faculties and students through the various schemes and programs of MHRD and GoI as NCC, NSS, Hindi Diwas Celebration, Unnat Bharat Abhiyan (UBA), Swachhta Abhiyan, Ek Bharat Shrastrh Bharat, Matri Bhasa Diwas etc. along with the various clubs as Click Club for Photography, Raga Club for Music etc. and Chapter of various International / National societies as ISTE, IEEE of NIT Raipur.

### 1. Area of expertise:

Computational Fluid Dynamics, Computer Network, Cyber Security and Operating Systems, Computer Architecture, Parallel Processing, Networks, Machine Learning, Data Science, Data Mining, Image mining, Cyber Policies, Cloud, IoT Basics, Digital Literacy, Decision support system, IOT, Metaheuristics technique for combinatorial optimization problems, Computer Network, Network optimization, Information Security, Cyber Security, Computer Networks, Operating Systems, Android, Java, NLP, Text Analysis, Adversarial Attack using Machine Learning, Evolutionary Techniques for Financial Time Series Prediction.

### Details of the Research and Development Project having departmental contribution.

**Theme:-** Metaheuristic Techniques for NP- Hard Spanning Tree Problems finding its application in Telecommunication, VLSI Design, Electrical Circuit Design, Linear Light Wave Networks (LLNs), Road Systems etc, Benchmark evaluation of JPEG forensics scheme (s) will help forensic laboratories and forensics experts to identify secure forensics methods for automatic evaluation of any suspect image, Design of an algorithm for improving robustness of power grid controller under cyber- attack scenario,

Medical effect of performing meditation to improve quality of life, Addressing of heart rate variability using linear or non-linear methods.

Status:- Two Project are Completed and two are going on, Amount for Completed Project:- 41.46 Lacs, Amount for On Going Project:- 87.36 Lacs, Funding Agency:- SERB- DST New Delhi, MeitY, DST – ICPS, SERB.



## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

The Department of Computer Science & Engineering was established in the year 2000. The department offers high quality undergraduate and doctoral programs. The degrees offered by the department include B.Tech (Bachelor of Technology) and Ph.D. (Doctor of Philosophy in CSE). Currently, the B. Tech (Computer Science and Engineering) program with an intake of 102 students. The Department provides an outstanding research environment complemented by superior teaching for its students to flourish in. The department has distinguished and committed faculty members with PhD from reputed institutes. The Department boasts of highly qualified faculty who are active members of reputed National and International societies. They are instrumental in the research publications and in reviewing papers in many leading journals. The department has carried out active research in different fields of computer science and engineering. In addition to regular academics, the department undertakes R&D and consultancy projects. The department is also providing extensive industrial training, organizing faculty development program, conferences and expert lectures focusing on emerging technologies.

### 1. Area of Expertise:

Deep Learning, Machine Learning, Database Systems, Evolutionary Computing, Big Data, Data Analytics, Deep learning, Computational Intelligence, Data Mining, Text Mining, Software Engineering, Data Science, Applications of Soft computing techniques, Web mining, Distributed System, Wireless sensor Networks, Internet of Things, Mobile Ad-hoc Network, Information Security, Blockchain, Cryptography, Authentication, Distributed, Grid and Cloud Computing.

### 2. Research Projects:

1. Dr. Pradeep Singh, Development Of a Comprehensive Model for Software Fault Prediction, Date of Award: - 2013, Funding Agency: - CCOST, Amount in lakhs of Rs. 5 Lacs, Status: -Completed.
2. Dr. Naresh Kumar Nagwani, Predictive and Visual Analysis of the Price Distribution Information of Rice and Wheat across India. Date of Award: - 2013, Funding Agency: - CGCOST Raipur, Amount in lakhs of Rs. 4.50 Lacs, Status: - Completed.
3. Dr. Naresh Kumar Nagwani, Development of Framework for web Based Intelligent Dictionary for Learning Chhattisgarhi Language Date of Award: - 2015, Funding Agency:- CGCOST Raipur, Amount in lakhs of Rs 4.00 Lacs, Status:- Ongoing.
4. Dr. Dilip Singh Sisodia, Modelling of autonomous software agents' behaviour to defend HTTP request attacks. Date of Award: - 2015, Funding Agency :- CGCOST Raipur, Amount in lakhs of Rs. 4.90 Lacs, Status: - Completed.

### 3. Laboratory Facility:

Department of CSE has several well-equipped computer laboratories with 100 computers and 10 workstations to cater the needs of CSE students. The present infrastructure is excellent to carry out research and other academic work by UG and PhD students. Department uses a number of software's available centrally at NIT Raipur like MATLAB, .Net, SPSS and many numbers of open source software's to carry regular academic and research works.

#### Three instructional labs:

- I Project Lab (40 PC)
- I Advance Lab (40 PC)
- I Research Lab (20 PC)

### 4. Advanced Research Facility and Research Lab

| S.NO | Item                                       | Item Configuration   | Quantity |
|------|--|--|----------|
| 1.   | HPZ 620 Workstation                        | 8GB RAM, 1TB HDD, Intel Xeon Processor, Win 10                   | 7        |
| 2.   | Lenovo ThinkStation Intel Xeon Workstation | 32GB RAM, 1TB HDD, Intel Xeon Processor, Win 10                  | 10       |
| 3.   | Dell EMC Power Edge GPU Server             | 128GB RAM, 4TB + 4TB HDD, Intel Xeon Processor, Win Server 2019. | 2        |
| 4.   | IOT Development Tool and Scratch Module    | Includes various sensors and microcontroller etc.                | 1        |

### 5. Facilities available in the department

#### Hardware Testing: -

- Hardware configuration, determination for equipment
- Software development and Consulting: Data Science Consulting with Artificial Intelligence and Machine Learning. Data Analytics Consulting Services, Business Intelligence Consulting Services, AI based software Development, IOT based development.





# DEPARTMENT OF ELECTRICAL ENGINEERING

Electrical Engineering Department was established in 1958 in erstwhile Govt. College of Engineering & Technology Raipur (presently NIT Raipur). The department runs UG, PG and PhD programs (01 each). The department has 23 motivated faculty members (15 Regular and 8 on Contract) majorly having an expertise in power system, control system, electric drives, instrumentation and control. Department aims at imparting the state-of-the-art knowledge and skills to the students. Thus, developing them into excellent Electrical Engineers, Entrepreneurs, Scientists, and Academicians.

## 1. Faculty Details:

Power System & Power Quality/ Power Quality, Power Electronics & Electrical Machines, Integrated Power System/Power System, Power System Protection, Artificial Intelligence Application in Power System Protection, Soft Computing Techniques, Protection of Micro grid and Smart Grid, Measurement & Instrumentation/Signal & Image Processing, Medical Instrumentation, Speech Signal Processing, Machine Learning, Control System & Signal Processing/ Control System, Soft Computing, Biomedical Engg. Pattern Recognition, Power and Energy Systems, Renewable Energy, Grid-Tie PV Inverters Design and optimization of power conditioning circuits for DC-DC converters and inverters Power electronic circuit modeling and simulation Switch-mode power supplies Power Electronics and its interface with other Renewable sources, Power System Protection, Soft Computing Techniques, Electrical Machine & Drives, Power Electronics, Converters for Renewable energy application, Electrification of transportation, Switch mode power supplies,

## 2. Research Projects

Dr Anamika Yadav, A single ended directional relaying algorithm based on ANN for fault classification and zone identification of double infeed transmission line:- 3 years, Funded amount- 4.4 lakhs, Funding Agency- CGCOST, Year- 2013.

1. Dr. N.D. Londhe,, Speech Recognition for Chhattisgarhi:- 3 years, Funded amount-5 Lakhs, Funding Agency- CGCOST, Year- 2013.
2. Dr. Subhojit Ghosh, Development of circuit Based Model for the Analysis of Glucose Regulation System:- 3 years, Funded amount-4.8 Lakhs, Funding Agency- SERB, Year-2017.
3. Dr. Vinay Pratap Singh, Derivation of time Moments and Markov Parameters and their Applications in Model Reduction of Discrete interval System:- 3 years, Funded amount 15.25 lakhs, Funding Agency- SERB, Year-2017
4. Dr. Subhojit Ghosh, Microcontroller based implementation of mathematical model of insulin section for automated glucose regulation:- 3 years, Funded amount-4.85 Lakhs, Funding Agency- CGCOST, Year-2014.
5. Dr. Subhojit Ghosh & Dr. Susovan Samanta, Hybrid optimization based fractional order fuel modeling and online parameter estimation with design of adaptive controller for integrated power converters :- 3 years, Funded amount-34.79 Lakhs, Funding Agency- NRB, Year-2015.
6. Dr. (Mrs ) Ebha Koley, A Hybrid Artificial Neural Network and Fuzzy Logic Approach with wavelet Transform Based Multi- Resolution Analysis for Fault Detection Classification and Six Phase Transmission Line:- 3 years, Funded amount-4.96 Lakhs, Funding Agency- CGCOST, Year-2015.
7. Dr. Monalisa Biswal, Advance Protection to Prevent Zone-3 Maloperation during Stress System Condition. :- 3 years Funded amount- 5.96 Lakhs, Funding Agency- SERB, Year-2015.

8. Dr. N.D. Londhe, Development of Efficient Devanagari Script Input Based P300 Speller System for Brain-Computer Interface.3 years, Funded amount-27.10 Lakhs, Funding Agency- MNRE, Year-2016.
9. Dr. Anamika Yadav, Studies to Improve the Performance of Fault Location Algorithm for Multi-Location Shunt Faults in Transmission Line: A Case study of Chhattisgarh State. :- 3 years, Funded amount- 27 Lakhs, Funding Agency- CPRI, Year-2016.
10. Dr. Lalit Kumar Dr. Shubhrata Gupta(Co-PI), Development of Single- Phase Fault Tolerant Topology of Multilevel Inverter With Reduced:- 3 years, Funded amount- 43.54 Lakhs, Funding Agency- DST-SERB, Year-2017.
11. Dr. N. D. Londhe, Machine Based Behavioural Multiparametric Pain Assessment System:- 3 years, Funded amount 23.56, Funding Agency- DST-SERB, 2018.
12. Dr. S. Gupta, Dr. Lalit Kumar, Design & Development of Low Cost Single Phase Fault Tolerant Multilevel Inverter Topology:- 3 years, Funded amount- 23.56, Funding Agency- SERB, Year-2018.
13. Dr. (Mrs) S. Gupta, Design of Microbial Electrolytic Cell for economic and energy efficient bio hydrogen production from leafy biomass by electrohydrogenesis. , Funded amount- 37.61, Funding Agency- MNRE, Year-2015.
14. Dr. (Mrs) S. Gupta, Design of Microbial Fuel Cell Integrated Microbial Electrolytic Cell Reactor and Study of its Structural and Process Parameter for Economics Production of Bio- Hydrogen by Electrohydrogenesis , Funded amount- 23.42, Funding Agency- DBT, Year-2018.
15. Dr. S.Ghosh, Dr. T. K. Das, Dr. E. Koley, , *Detection of Data Attacks and Design of a Resistance Mechanism in Smart Grids*, Funded amount- 66.47, Funding Agency- SERB, Year-2019.
16. Dr. R N Patel, Dr. Lalit Kumar Sahu, Design and Development of Multiple Input Power Electronic Converters for Solar Photovoltaic Panels ” , Funded amount- 31.24, Funding Agency- SERB, Year-2019.

### 3. Testing facilities available in the department

| S. N. | Name of Testing equipment along with photograph/software/other facility | Amount to be paid to carry out particular test |
|-------|---|--|
| 1     | Induction Motor Test Setup  | 12000 for 15 HP and 2000/HP above 15 HP        |
| 2     | Welding Transformer Test Setup  | 6000 for 15 KVA and 200/KAV above 15 KVA       |
| 3     | Energy Meter Testing Kit<br>Single Phase<br>Three Phase                 | 1000/-<br>4000/-                               |
| 4     | Testing of CTs  | 2000/-   |
| 5     | High Voltage Cable Testing  | 2000/-   |
| 6     | Resistance Test of Cable<br>Single Core                                 | 2000/-   |

|    |  |   |
|----|--|---|
|    | Three Core   | 4000/-                                    |
| 7  | High Voltage Testing of Transformer  | 600/-                                     |
| 8  | Testing of Instruments, Voltmeter, Ammeter, Wattmeter, Calibration of Multimeter, Megger, Earth Tester | 330/-, 330/-, 660/-, 2000/-, 660/-, 660/- |
| 9  | LED Bulb   | 2000/-                                    |
| 10 | LED Street Light   | 5000/-                                    |
| 11 | LED High Mask  | 7000/-                                    |
| 12 | LED Ballast  | 8000/-                                    |



## DEPARTMENT OF ELECTRONICS & COMM. ENGINEERING

The Department of Electronics & Communication Engineering has been playing a vital role in producing scientists and technologists of highest calibre ever since it was established in the year 1985. The department runs one under graduate program and 1 post-graduate program as of now.

The infrastructure and lab facilities are upgraded from time to time and provide adequate opportunities for students and researchers to learn and innovate. The department has distinguished faculty, all holding Ph.D. degrees from renowned institutes. The faculty of the department has been constantly carrying out research on many cutting-edge technologies and regularly publishes in IEEE and other top international journals. The department also undertakes research projects sponsored by both the government and the industry. Following are the details of the faculty count and their area of expertise.

**1. Area of Expertise:** Digital system design, image processing, computer & communication networks, distributed processing, Semiconductor device modeling and simulation, Digital Communication, Wireless Sensor Network, Artificial Intelligence, Cryptography & Network Security, Signal Processing, Mobile Communication, Soft Computing, Distributed source/channel coding, Error correction codes, Digital system design, Microwave and antennas, Multimedia Security/Forensics, ComputerVision, Image/Video Processing, DSP filter design, Soft computing, Antenna & Microwave Engineering, Microstrip & Dielectric Resonator Antennas, Superjunction power devices, High k power devices, SiCpower devices, strain effect on power devices.

### 2. Research Projects

1. Prof. Dr. S. Verma (PI) & Dr. B. Acharya (Co-PI), Title: Special Manpower Development Project Chip-to-System Design, (SMDP C2SD), Funding Agency:MeitY, Govt. of India, Amount:96 Lakh
2. Prof. Dr. S. Verma (PI), Title:Design & development of dynamically controlled walker system, Funding Agency:DST, Amount:23.12 Lakh
3. Prof. Dr. S. Verma (Co-PI), Title:Development of compressive model for software fault prediction, Funding Agency:Chhattisgarh council of science & technology, Amount:5 Lakh
4. Prof. Dr. S. Verma (Co-PI), Title:Predictive & visual analysis of the price distribution information of rice & wheat across India, Funding Agency:Chhattisgarh council of science & technology, Amount:4.5 Lakh
5. Dr. B. Acharya (PI) &Dr. A.S. Raghuwanshi (Co-PI), Title: Information Security Education and Awareness (ISEA) Phase II, Funding Agency:MeitY, Govt. of India, Amount: 36.06 Lakh
6. Dr. ToshanalMeenpal (PI), Title:Design and development of an Automatic Kinship Verification system for Indian faces with possible integration of AADHAR Database, Funding Agency: SERB, Dept. of Science and Technology (DST), Amount: 25 Lakh
7. Dr. Toshanal Meenpal (Co-PI): Title: Design of JPEG Anti-Forensics Scheme(s) for evaluation of existing JPEG forensic schemes, Funding Agency: MeitY, Govt. of India, Amount: 28 Lakh
8. Dr. S.K. Saha (PI), Title: Detection of QRS complex of ECG signal using optimally designed pre-processor and it's online testing, Funding Agency: SERB, Dept. of Science and Technology (DST), Amount: 29.32 Lakh

9. Dr Ajay Singh Raghuvanshi, (PI), Title: Integrated Renewable Resources and Storage: Operation and Management [IReSOpm], Funding Agency: Jointly funded by the Department of Science and Technology (DST) for the Indian side and the Research Council of Norway (RCN) for the Norwegian side. Amount: Rs 46,52,760 (India side)

### 3. Testing facilities available in the department

#### Hardware Testing: -

- Hardware configuration, determination for equipment (BELARC Testing).
- In house Single sided PCB making and Testing.
- Testing of Microwave Components using Vector analyzer.
- Microwave Test kit for testing of active and passive components

#### Software Testing: -

- Analog and mixed Signal design and verification.
- VERILOG and VHDL based digital circuit design and verification.



## DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

The Department of Humanities and Social Sciences was created in order to cater the need of graduate and post graduate students of the Institute. The Dept. has 6 full time 3 part time and 2 temporary faculty members. Their teaching area varies from English Communication and Socio –Linguistic to Yoga Health and Hygiene.

**1 Area of Expertise:** Business Communication Skill, Corporate Communication Skill, Interpersonal Leadership Skill, Soft Skill, Communication Skill, Cultural Competence.

### 2. Research Details

1. Dr.Jaya Dwivedi, Funding Agency- SCERT-Govt. of Chhattisgarh, Funded amount 60,000/-, Innovative Approaches to Develop Communication Skill of Student of Govt. Boys Middle School Nardaha,Arang,Raipur.
2. Dr.Shashikanta Tarai, NITRR/Seed Grant, 5 lakh, Mindful yoga practice enhances attentional mechanisms and modulates cognitive control: A behavioural and neurocognitive study with engineering students in Chhattisgarh.
3. Dr.Sandip Sarkar, NITRR/Seed Grant, 4 lakh, Flows, Boundaries and Hybrid: Tracing the Tune of Rationality in the Folk Song and Music Video of Chhattisgarh and Bengal.
4. Dr.Y.V. Babu, NITRR/Seed Grant, 3.95lakh, An Empirical Study on the Contextual Relevance of ICT- CALL Modules and its Role in Promoting Employability Skills Among Engineering Students in Chhattisgarh.
5. Dr. Moksha Singh, NITRR/Seed Grant, 5 lakhs, Children in conflict: A study on the rehabilitation process in Chhattisgarh.

The Department has state of art multimedia language laboratory, which helps especially undergraduate students to enhance their communication skills. Presently the Dept. has 10 full time and 09 part time PhD scholars working in various fields ranging from regional literature ELT to psycho-linguistic. In addition to teaching regular courses and thesis supervisions, faculty members also offer STTPs/Conferences/ Workshops for students and professionals and faculty members from other organizations. Faculty member's acclaimed research output may be seen in reputed national and international journals. Apart from academics, Dept's faculty members are also involved in various social and entrepreneurial activities in the form of mentor of student club.



## DEPARTMENT OF INFORMATION TECHNOLOGY

Departmental faculties have good expertise in different domain knowledge of Computer. The department provides testing facility of different software and hardware. Faculty members are also expert in decomposition of problem and solve with help of computer. Faculty members can help to different software organization to solve their problems.

### 1. Area of expertise:

Computer Organization, Computer Networks, Cellular and Mobile computing, Artificial Intelligence, Digital Image Processing, Machine Learning and Soft Computing, Mobile-Adhoc Networks, Sensor Networks, Mobile Computing, Genetic Algorithm, Computer Architecture, Data Mining and Analysis, Machine Learning, Text Mining, Social Mining, Computer Vision, Image Processing and Analysis, Bio Medical Data Analysis, Data Mining, Machine Learning, Design of Algorithms, 5G Communication, Computer Network, Distributed & Cloud Computing, Robotics & Artificial Intelligence, Soft Computing, Machine Learning, Artificial Intelligence, Image Processing, Networking, Wireless Sensor Network, Parallel & Distributed Computing, Algorithms, Big Data Processing.

### 2. Research and Consultancy, Sponsored Research Projects

1. NITRR/ RP/IT/2015/052 : “Development of Framework for web Based Intelligent Dictionary for Learning Chhattisgarhi Language”, Year- 2015-2017, Funding Agency- Chhattisgarh Council of Science and Technology, Funded amount - 4 Lac
2. NITRR/RP/ IT/2018/ 111 To Propose an Optimize Resource Allocation Schemes Framework for Device Tier Communication for 5G Cellular Networks, Year- 2018-2021, Funding Agency- Science & Engineering Research Board (SERB), Funded amount - 14.75 Lac
3. Design and Development of Customized Welding Robot for Industrial Applications, Year- 2018-2020, Funding Agency- Shanta Techno Pvt. Ltd., Funded amount - 3.96 Lac
4. Design and Development of Dynamically Controlled Walker System”/SEED Division, Year- 2014-2017, Funding Agency- Dept. Of Science and Technology, Funded amount - 23, 12, 460.00



## DEPARTMENT OF PHYSICS

### 1. Faculty Details:

Material Science, charge storage & transport in polymer thermoelectrets, Luminiscence, electrical behavior of ceramics, Luminiscence, this film related to luminescence materials, Experimental condensed matter Physics, Optical properties of nanophosphors, II-VI Semiconductor thin films, Inorganic solar cells, Theoretical condensed matter physics and applications. Thermoelectric efficiency of InGaN, Condensed Matter Physics (Theory), Band structure, calculation of materials, optical and thermo-electric properties of rare earth based semi-conductor materials

### 2. Research Projects

1. Dr. Sadhana Agrawal, Preparation and Characterization of Microcellular Nanocomposites for packaging and semiconducting application, Funding Agency- CCOST, Raipur, 2011, Funded amount - 2 Lakhs
2. Dr. Ayush Khare, An investigation on the optical and structural characterization of some ferro-electric materials, Funding Agency- CCOST, Raipur, Year-2013, Funded amount - 5 Lakhs
3. Dr. B. K. Sahoo, Role of Spontaneous and Piezoelectric Polarization on Thermal Properties of Wurtzite Nitrides, Funding Agency- CCOST, Raipur, Year- 2013, Funded amount - 5 Lakhs
4. Dr. S. M. Saini, Electronic optical and magneto optical properties of rare earth compounds, Funding Agency- CCOST, Raipur, Year-2013, Funded amount - 5 Lakhs
5. Dr. B. K. Sahoo, Effect of interface, Strain and Phonon Confinement on Thermal Conductivity and Thermoelectric Efficiency of GaN/In GaN /GaN Superlattices, Funding Agency- SERB New Delhi, Year-2017, Funded amount - 17.17 Lakhs
6. Dr. Ayush Khare, Development of Highly Efficient CdTe/CdS Tandem Multijunction Photovoltaic System Through Optimization of Various Components, Funding Agency- SERB New Delhi, Year-2017, Funded amount - 34.9 Lakhs
7. Dr. Piyush Jha, Dr. Ayush Khare (Mentor), Development of Highly Efficient Crack Sensor/indicator using Mechanoluminescent Phosphors, Funding Agency- SERB New Delhi, Year-2019, Funded amount - 19.2 Lakhs

### 3. Testing Facilities

| S.N. | Name of Testing equipment along with photograph/software/other facility | Description of Testing Task view  |
|------|---|---|
| 1    | <b>TLD Reader</b>   | Measurement of thermoluminescence from a powder sample.   |
| 2    | <b>UV-Visible Spectrophotometer</b>                                     | To measure absorption/transmission spectra in UV and visible range  |
| 3    | <b>Spectrofluorophotometer</b>  | To measure photoluminescence spectrum of a powder/film sample   |
| 4    | <b>LCR Meter</b>  | It is used to measure the inductance (L), capacitance (C), and resistance (R) of an electronic component. |



|   |                             |  |
|---|-----------------------------|--|
| 5 | <b>FT-IR Spectrometer</b>   | It is used to obtain an infrared spectrum of absorption or emission of a solid and liquid.   |
| 6 | <b>Raman spectrometer</b>   | It is used to determine vibrational modes of molecules, although rotational and other low-frequency modes of systems may also be observed. |
| 7 | <b>Chromameter</b>          | To measure the amount (in Cd/m <sup>2</sup> ) of light being emitted by a sample.  |
| 8 | <b>AAA Solar Simulation</b> | For the electrical characterization of a solar cell.   |



## DEPARTMENT OF MATHEMATICS

The Department of Mathematics was started in the year 1956. The department provides an outstanding research environment and offers academic programs leading to the award of Ph.D. degree. Apart from this, department taking care of Mathematical input to all undergraduate and postgraduate courses in Engineering and Computer Science Applications.

### 1. Area of Expertise:

Algebra, Rough and Fuzzy Set Theory, Linear Algebra, Probability, Statistics and Stochastic Process, and Operations Research, Mathematical Ecology, Mathematical and Chaos Modelling, Fluid Dynamics, Micropolar fluids, Flow through porous media, Immiscible fluids, Mathematical Modelling, Mathematical Ecology, Cryptology, Sampling Theory, Computational Statistics and Data Analysis

### 2. Research Projects :

1. Dr. Arvind Kumar Sinha, A Study of Dual Concepts in Modules in Algebra, Funding Agency- CCOST, Chhattisgarh, Funded amount - 5.00 Lac.
2. Dr. Debasisha Mishra, Matrix Splitting of Rectangular /Singular Matrices and its Application to System of Linear Equations, Funding Agency- CCOST, Chhattisgarh, Funded amount - 1.4 Lac
3. Dr. Debasisha Mishra, Analysis of Matrix Splittings and its Application in Context of Alternating Iteration Scheme for Rectangular Liner Systems, Funding Agency- SERB, Govt. of India, Funded amount - 14.86 Lac.
4. Dr. Debasisha Mishra, Study of Multisplittings of Rectangular/Singular Matrices and its Application in Parallel Solution of Linear Systems , Funding Agency- CSIR, Govt. of India , Funded amount - 4 Lac.
5. Dr. Debasisha Mishra, Study of Two-Stage Iterative Methods for Solving Rectangular (Square Singular) Linear Systems, Funding Agency- SERB, Govt. of India, Funded amount - 6.6 Lac.
6. Dr. Debasisha Mishra, Advanced Studies in Generalized inverses of Tensors, Funding Agency- SERB, Govt. of India , Funded amount - 12.46 Lac.
7. Dr. Sujit Kumar Samanta, Analytical and Computational Studies of some Queueing Models with Markovian Arrival Process and/or Markovian Service Process, Funding Agency- CSIR, Govt. of India, 16 Lac.
8. Dr. Sujit Kumar Samanta, A Study on Inventory Management at Service Facility, Funding Agency- National Board for Higher Mathematics (NBHM), Govt. of India, Funded amount - 13.34 Lac
9. Dr. Sharada Nandan Raw, Mathematical Modeling of Ecological System : An Application to the Biological Science , Funding Agency- SERB, Govt. of India, Funded amount - 20.29 Lac
10. Dr. Madasu Krishna Prasad, Cell models for micropolar fluid past porous particles, Funding Agency- CCOST, Chhattisgarh, Funded amount - 1.4 Lac
11. Dr. Nilesh Kumar Thakur, Modelling Pattern Formation in Spatial Aquatic Systems: Mathematical Models and Applications, Funding Agency- CCOST, Chhattisgarh, Funded amount - 1.0 Lac
12. Dr. Nilesh Kumar Thakur, Dynamical Study of Delay- Induced Stability and Chaos in Plankton Population, Funding Agency- SERB, Govt. of India, Funded amount - 15.11 Lac

13. Dr. Deepmala Sharma, A Randomized Double-Blind, Placebo Controlled Trial with an Open Label Extension to Assess the Immuno-modulatory Effects of Ashwagandha (*WithaniaSomnifera*) Extract on Healthy participants , Funding Agency- EticaClinpharmPvt. Ltd., Raipur, Chhattisgarh, Funded amount - 0.34 Lac



## DEPARTMENT OF MECHANICAL ENGINEERING

Established in year 1958-59 in the erstwhile GEC, Raipur, Department of Mechanical Engineering presently offers undergraduate program (B. Tech.) in Mechanical Engineering (intake: 90) and three Postgraduate programs; (M. Tech.) in Thermal Engineering (intake: 17), Machine Design (intake: 13) and Industrial Engineering and Management (intake: 13). Department also offers Ph.D. program in all relevant discipline of Mechanical Engineering including Design, Production, Thermal and Industrial Management.

### 1. Area of Expertise:

Strategic Management, Mechanisms and Machine Design, Robotics, CFD, Environmental Engineering., Environmental Engineering., Alternative Fuels, Heat Transfer, Tribology and Machine Design, Solar Energy, Refrigeration and Air Conditioning, Thermal Engineering, Turbo machinery, I C Engines, Alternative Fuels, Production Engineering, Composite materials, Finite Element Method, Vibration analysis, Finite Element Method, CAD, Machine Design, FGM, Machine design, Computational Fluid Dynamics applications in Multiphase flows, Rheology of complex fluids, Oil & gas well drilling, Solar cookers, Industrial Engineering and Management, Heat Transfer, Refrigeration-Air Conditioning, , Industrial Engineering, SCM and Optimization, Fracture Mechanics, X-Finite Element Method, Composite Materials, Tribology, Thermal Engineering, Thermal Comfort, Industrial Engineering and Management, Fatigue, Material Characterization, Smart structures, Industrial Engineering and Management, Green material development, decision making tools, renewable energy.

### 2. Research Projects:

1. Determination of Operating Conditions for hydro-transport of mineral slurry based on wall shear stress and head loss measurement for mineral industries of Chhattisgarh State [CGCOST – 5.00 Lacs] by Dr. S. L. Sinha & Dr. S. K. Dewangan
2. Development Characterization of Functionally Graded Material with Self-Lubrication Property for Cutting Tool Applications [CGCOST- 3.50 Lacs] by Dr. G. Srinivasu and Dr. R.K. Sahu
3. Characterization of Strain Induced Behaviors of Electro-active Polymers for Sensor and Actuator Applications [DST-SERB New Delhi – 31.52 Lacs] by Dr. Raj Kumar Sahu
4. Design and validation of bike-based patient carrier transport system for remote areas of Chhattisgarh [UNICEF – 10.00 Lacs] by Dr. S. Bhowmick and Dr. G. Bhat
5. Experimental investigation and modelling of ultrasonic jet electrode position and machining for micro part fabrication [DST - 33.00 Lacs] by Dr. H.K. Narang and Dr. M.S. Rajput
6. Design of a slag removal mechanism from the furnaces [Real Ispat and Power Limited - ] by Dr. S. Bhowmick and Dr. V.K. Gaba
7. Experimental Investigation and Modeling of Micro Milling Assisted Ultrasonic Jet Electrodeposition (Mauje) For Micro Part Fabrication [NITRR Seed Grant – 5.00 Lacs] by Dr. M.S. Rajput

### 3. Testing Facilities:

The Department hosts latest state of infrastructure and lab facilities. These include: Universal Testing Machine (UTM) of 20 Tons, Four Ball Tester, Pin-on disk apparatus, Photo-elastic bench, Stress freezing oven, Rheology Lab, Solar thermal training kit, Solar thermal concentrator, KD2-pro Thermal conductivity measurement apparatus, Smoke level measurement apparatus, Pyranometer for solar radiation measurement, Smoke meter for the emission level in the exhaust gas, temperature & humidity measurement data logger etc. The department hosts state of art workshop with advanced welding facilities as Tungsten inert gas welding (TIG), Submerged arc welding (SAW), CNC machines. The Department has the latest

modeling and analysis softwares for Computer based Design and Simulation such as, CATIA, SOLID WORKS, DEFORM-3D and ANSYS-Fluent etc.



## DEPARTMENT OF METALLURGICAL & MATERIALS ENGINEERING

The Department of Metallurgical engineering started in 1956. Recently, it is renamed as Department of Metallurgical and Materials Engineering. The Department is running undergraduate and doctoral program. The post graduate program shall be introduced soon.

### 1. Area of Expertise:

XRD and SEM testing and analysis, High Entropy Alloys, Heat Treatment of Alloys, High Strain rate deformation, Synthesis and characterization of Nanomaterial and Nanofluid, Heat Transfers in Nanofluid, Electrochemical Characterization (Tafel and EIS), Alloy design for various applications, Applications of Density Functional Theory for Materials Design for Various applications, Foundry, Solidification, Advanced Metal Casting Technology, Physical Metallurgy, Testing of Materials, Alloy development, Non-ferrous alloys, Business analysis, development of AI based predictive models, data analysis related to Materials and Metallurgical processes, Structure property correlation, Welding, Composite materials, Tribology, Thin Films, wide band gap semiconductors, light metals and alloys, structural and Bio-ceramics, structure-property correlations in advanced engineering materials, Failure Analysis of Products/Parts / Structures (Metals /Ceramics/Composites), Tensile, Compression, Hardness (Micro/Macro) tests, XRD, Microstructural (Optical, SEM), Heat Treatment studies for property enhancement and Analysis, 3D Printing of Polymer Structures and its analysis, Casting of Metal Lattice/Cellular Structure.

### 2. Research Projects

1. Dr. Manoj Chopkar has completed two research projects as Principal Investigator (PI): Study of high rate torsional behavior of Aluminum-Zinc alloy (Al 7075) funded by Science and Engineering Research Board (SERB), India of Rs. 23, 27,000/- and Study of Ageing Behaviour of Copper added Austenitic Grade Stainless Steel and Modelling of Aging Characteristics funded by The Institution of Engineers, India (IEI) Research and Development program of Rs 50,000/-. Dr. Subhas Ganguly was the Co-PI in the second project.
2. Dr. Sanjeev Das has completed one project as PI on Improving the Strength of Aluminum 6082 (T6) Alloy by suitable Age-hardening Treatment of Rs. 3,75,000/- funded by Cold Forge Limited. Another two projects (Development of Sustainable Metal Casting Technology for Low Green House Emission of Rs.45,00,000/- funded by Royal Academy of Engineering in collaboration with Vedanta Limited & University of Warwick and Identifying the basis of Dross Generation in the molten Al-Si Aluminum Alloy of Rs. 5,00,000/-funded by BALCO) are under progress.
3. Dr. Sudip Kumar Sinha has been awarded the DST-SERB CORE Research grant project (Grant No: CRG/2019/003480) as P.I. on "Development of Low-ppm Ammonia sensors using NiO/CeO<sub>2</sub> heterostructured nanofibers" with a fund of Rs. 33 Lakhs /-.

### 3. Testing Facilities

The Department has developed facilities of XRD, SEM, Universal Testing Machine, Vacuum Arc Melting Unit, Wire cut Electro-discharge machine, Friction Stir Welding unit, Ball Mill, Potentiostat, Pin-on-disk wear testing set up, Optical microscopy facility and several workstations for modeling and simulation activities. Several other facilities are under development to facilitate research work of the PhD scholars, testing and consultancy services and laboratory work of undergraduate students.



## DEPARTMENT OF MINING ENGINEERING

The Department of Mining Engineering was established in the Year 1956 with intake capacity of only 15 students. Due to increasing demand of mining engineers from coal and mineral industry, the intake capacity has now been increased to 77. At present, there are 291 undergraduate students in various semesters and 13 PhD scholars registered in the Department. The Department is equipped with state of the art modern instruments and equipment for conducting various laboratory and research work. The Department has undertaken and successfully completed number of testing and consultancy projects.

**1. Faculty Details:** Blasting Engineering, U/G Coal Mining, Mine Surveying, Mineral Engineering, Mine Environment, Rock Mechanics, Strata Control, Blasting Engineering, Mine Environment, U/g Metal Mining, Rock Mechanics, Surface Mining, Ground Vibration study, Slope Stability, Ventilation, Environment, CFD, Geo-statistics, Computer Applications, Geomatics, Economic Analysis, Slope Stability, Mine Safety Engineering, Occupational Health and Safety, Accident Investigation System, Risk Based Accident/Incident Management System, Disaster Management, Mine Legislation and General Safety, Rock blasting, Rock mechanics, Mine Legislation.

Laboratory testing equipments for measurement of various physic-mechanical properties of rocks & soils; Equipment for measurement of whole body vibration; Equipment for measurement of chemical composition of water samples; Equipment for measurement of personal dust exposure; Equipments for conduction of mine ventilation survey; Equipments for mine surveying; Software for slope design and stability analysis; Software for design of structures; Software for mine planning; Equipments and Software for measurement and analysis of blast induced ground vibrations and inhole VOD of explosive.





## CAREER DEVELOPMENT CENTER

As per the vision of the institute and under the advice and guidance of the Director, the erstwhile Training and Placement Department was restructured and realigned to focus on developing innovation and entrepreneurial skills in students, while also continuing with endeavors to provide the relevant career opportunities to them. To take care of students' career and also to motivate them towards path of innovation and entrepreneurship, four cells to specifically focus on these activities were constitute under the career development center – the placement cell, the training and internship cell, the innovation cell, and the entrepreneurship cell.

### Placement Cell

The placement cell continues to make efforts for ensuring campus placement opportunities for students under the leadership of Dr Manoj Chopkar as the faculty in charge. We are happy to share that due to your support NIT Raipur has been making continues improvement in types of career opportunities and the offers the students are getting every year. We request your continued support by giving us the opportunities to meet your requirements of qualified and skilled professionals for your professional team.

### Training and internship Cell

The training and internship cell endeavors to impart students with the various skill sets required to meet the industry expectations and also to ensure professional and personal success in their career and life. The skilling of students is looked after Dr Suraj Kumar Mukti as the faculty in charge. Dr Alok Naugarhia looks after the internship of the students. Your continued help in this area has made our students readily acceptable by various employers. We look forward to your continued support to expose our students to the best practices in industries, by providing them opportunities to train with your team, to guide them with seminars and interactive sessions by your leaders. Accepting the longstanding industry demand, we have also modified our academic schemes for M Tech programs and B Tech programs to accommodate, respectively, one year internship for M Tech program and six month internship for B Tech programs (from 2022 batch). We request you to take advantage of this and select students as interns for your organization.

### Innovation Cell

Both the innovation cell and the entrepreneurship cells are keenly driven to create environment and support system to motivate and nurture the innovation and entrepreneurial skills of the students through orientation programs, exposure sessions by experts, workshops, and various events to test and hone the skills of students.

Innovation Cell, since its creation in May 2018 under the supervision of Dr Saurabh Gupta as the faculty in charge, aims to inculcate the spirit of innovation and entrepreneurship amongst the students, encourage and support innovations through guidance, mentorship and support. Students are encouraged to take up innovative projects with possibility of commercialization.

## Objectives

The objectives of Innovation Cell are:

- To channelize the knowledge and the energy of youth towards becoming active partners in the economic development process
- To motivate, support and mentor students for identification and development of their innovative ideas
- To catalyse and promote development of knowledge-based and innovation- driven enterprises and promote employment opportunities amongst youth specially students
- To inculcate a culture of innovation driven entrepreneurship
- To act as an institutional mechanism for providing various services including information on all aspects of enterprise building to budding S&T innovators
- To make students understand challenges of an entrepreneur and its solutions in frugal conditions
- To make cost efficient lab equipments like 3d printers, drones and other DIY projects
- To encourage students for interdisciplinary representation and forming teams and bringing the expertise on one platform

## Infrastructure - Makerspace

Makerspace at NIT Raipur is set up on the theme of Open Community Technology Development Culture to promote mainly frugal innovations. It is set up to provide 24x7 working ecosystem to prospective entrepreneurs of NIT Raipur. Once the raw and innovative ideas start taking shapes, they are incubated in a proper system of Technology Business Incubator (TBI). Main Objective of the Makerspace is to provide a collaborative workspace for tinkering, making, learning, exploring and sharing ideas.

## Entrepreneurship Cell

The Entrepreneurship cell, NIT Raipur, under the guidance of Dr R. N. Patel as faculty in charge, manifests the essence of entrepreneurship in the passionate youngsters who have the zeal to pursue entrepreneurship and advocate this enthusiasm to the youth. Keeping this ideology in mind we not only provide the foundation to the entrepreneurial capabilities of the promising young minds but also help in nurturing their skills by providing resources to develop new ideas, mentorship programs, workshops to help them organize their strategy and frequent, highly interactive speaker sessions and lecture series.

At our flagship program, E-Summit, we aspire to create a mélange of eminent speakers who have proved themselves in diverse fields and are at the zenith of glory. Every year E-Summit is not just a conclave of innovative minds and epistemic elocutionists, but it is the place where ideas not only thrive but become the prototype and businesses. Some specific events organized every year

by us are 'INNOVATION YATRA', Cluedo, Ad-o-holic, the B-Plan competition, Wallstreet, HR Sutra, The Case-D-Studio, Cricnometrica, Entrepreneurship Development Programs, the "Counselling Quiz", E-Quiz, E-talks.

#### Some major activities under Innovation and Entrepreneurship Cell

- I. The Institute has developed 24X7 facility accessible to students- Makerspace to promote Innovation culture at NIT Raipur
- II. Two open elective courses – Basic Course in Entrepreneurship and Advanced Course in Entrepreneurship were started in 2019 with Wadhvani Foundation for 3rd and 4th year students. These courses are being delivered by Dr Subhas Ganguly and Dr Saurabh Gupta of the institute.
- III. Students have been provided number of Seed grants and Acceleration grants by the institute for Innovation and Entrepreneurship
- IV. Active participation of students and faculty members in MHRD Innovation Council activities, Hackathons, Entrepreneurship Summit, Webinars, Workshops, Exhibition and Competition for Innovations, Faculty Development Program
- V. Implementation of National Innovation and Startup Policy in the Institute is in the process
- VI. The Application for Technology Incubation Centre from DST NSTEDB at the Institute is in process.
- VII. The Cell works with IP Cell of the Institute to provide the support to students for patents. Few students have been granted patents.

#### Achievements

We have some achievements to boost our morale in this journey of two years:

- I. The Institute has been ranked in Band 'A' (Ranks between 11- 25) in Atal Ranking of Institutions on Innovation Achievements (ARIIA), 2020 by the Innovation Cell, Ministry of Education, Govt. of India among Institutes of National Importance, Central Universities and Centrally Funded Institutes on 18th Aug., 2020.
- II. NIT Raipur is also amongst top 5 Institutions in the East Zone and secured the top rank among centrally funded Institutes in Chhattisgarh.
- III. The Institute has been recognized as Host Institute (Business Incubator) by Ministry of MSME - GoI for implementation of the scheme "Support for Entrepreneurial and Managerial Development of MSMEs through Incubator".
- IV. The Alumni Association of the Institute has constituted a corpus fund specifically to promote Innovation and Entrepreneurship activities.
- V. The Institute Innovation Council (IIC) of the Institute was ranked among top 25 best IICs out of 950 in India for Innovation by MHRD Innovation Council in 2019
- VI. 3 Students Startups are registered and have been provided all possible mentorship in all the related areas i.e. technical, financial, managerial

VII. Students teams are consistently winning Smart India Hackathon and other National and International events every year

Innovation and entrepreneurial activities require a lot of hand holding and active support from industries. We request your wholehearted support in this entrepreneurial transformation of students. You can support us by sharing your technical and managerial problems that require innovative solutions, you can provide mentorship to our students, you are always welcome to share your experience and wisdom to our budding entrepreneurs, you can also fund their ideas by becoming a partner in their journey.

CDC endeavours to equip the students with skill sets that are both essential and coveted, in the continuously evolving areas of engineering and technology. We strive for symbiotic industry-institute partnership by involving institute with industry in several activities such as campus placements, internships, industrial visits, expert lectures and seminars from industry heads and prominent professionals. We also welcome your support to our students in their innovation and entrepreneurial journey.

For further details you may also like to visit the following links:

<http://cdc.nitrr.ac.in/>

<http://cdc.nitrr.ac.in/innovationcell.html>

<https://ecell.nitrr.ac.in/>

<http://cdc.nitrr.ac.in/trainingcell.html>

<http://tpo.nitrr.ac.in/>



## MEMORANDUM OF UNDERSTANDING (MOU)

### MoUs Signed by the institute during the last three years

| S.No | Agency / Institute                                     | Purpose of MOUs   |
|------|--|---|
| 1    | Chhattisgarh Council of Science & Technology (CGCOST)  | Recognise the mutual interest in the fields of research, training and development and dissemination of knowledge.   |
| 2    | Damghan University, Damghani, Islamic Republic of Iran | strengthen ties between the two institutions, which might lead in the future to the establishment of one or more mutual agreements for exchange purposes or academic cooperation. |
| 3    | Universidad Autónoma de Ciudad Juárez Mexico           | To explore the feasibility of establishing educational and scientific exchange programs.  |
| 4    | The University of Calabria. Italy                      | To establishment of one or more partnership agreements for exchange purposes or academic cooperation.   |
| 5    | National Institute of Industrial Engineering (NITIE)   | Agreed for institutional collaboration in education and research.   |
| 6    | National Ilan University, Taiwan                       | Lead in the future of establishment of one or more partnership agreement for exchange purposes or academic cooperation.   |
| 7    | VALI-E-ASR University of Rafsanjan. Iran               | strengthen ties between the two institutions, which might lead in the future to the establishment of one or more mutual agreements for exchange purposes or academic cooperation. |
| 8    | AIC@36INC., CG   | Provide incubation to selected promising start-ups of incubation centre at NIT, Raipur  |
| 9    | University of Warwick, United Kingdom                  | Collaborative agreement on the subject of research activities for the purpose of solving various challenges of science, engineering and technology.                               |
| 10   | Department of Commerce and Industry, CG                | To provide boost to entrepreneurial talent to skilled youth, helps in startup activities.   |
| 11   | NMDC, CG   | Feasibility studies on removal of contaminants from surface and ground water of Bailadila iron ore mine project and peripherals.  |
| 12   | Jayswal NECO Industries Ltd, CG                        | To promote an integrated and collaborative strategies approach to product research, design, development, technology transfer and innovation.                                      |
| 13   | Power Grid Corporation of India Ltd                    | Start long term collaboration in various area of business engineering and organization development for POWERGRID by exchanging intellectual resources and infrastructure.         |
| 14   | CG State Renewable Energy Development Agency           | Exchange of respective knowledges, expertise and experience. Exchange of their facilities, laboratories and infrastructure  |



## APPEAL

It gives me immense pleasure that our institute is moving ahead maintaining a stable growth. The present environment is very competitive and it has become necessary to have a growth by leaps and bounds, so as to place our institute in the top 30 in India and getting a rank in first 100 in the world. This target can be achieved through strong support by Students, Alumni, Faculties and all Well Wishers.

The development of any institute depends on the strong financial support by various stakeholders. All the prominent institutes in the world have a corpus build by the Alumni, Students and Faculties to support various developmental work of the institute. This includes development of Academic, Infrastructure and other Allied Facilities for the welfare of students. I have a strong faith and belief that we together can take this institute of Central India to higher ranks by our continuous effort.

NIT Raipur appeals to all Alumni, Faculty Members, Students and Well Wishers for their financial contributions. Donation is exempted under section 80G(5)(vi) of the Income Tax, 1961 Vide IT Order Number ITBA/EXM/S/80G/2019-20/1015830613(1) dated 29/04/2019

Donations by donors in “NIT Donation Fund” can be General Donation or for any of the given specific projects other than General Donations. Details of projects and required amount is given here:

**Click the link (or copy paste):**

**<http://www.nitr.ac.in/downloads/donation/Donation%20proposal%20at%20NIT%20donation%20ofund.pdf>**

### **How to Contribute**

There are following two options for amount contribution:

**Option A.** Donate online

**Click the link (or copy paste):** **<https://forms.eduqfix.com/nitrdfform/add>**

**Option B.** Financial Aid, as donations can be deposited in the bank account as given below –

**Name of the Bank:** HDFC Bank, Tatibandh Branch, Raipur

**IFSC Code:** HDFC0003692

**Name of the Account:** NIT Raipur Donation Fund

**Account Number:** 50100254910087

**PAN:** AAAJN0643G

Please email us at [chairman.arrgc@nitr.ac.in](mailto:chairman.arrgc@nitr.ac.in) if you transfer money so that we acknowledge your contribution.

No Amount of contribution is small. Your small contribution when combined with thousand others will create a significant impact. Your support is also solicited in terms of sponsoring specific activity/projects. Your support of a particular project will be recognized by way of naming buildings, facilities, Chair Professorships, Scholarships, etc. after you or after someone whose memory you would want to be perpetuated. For sponsoring a specific project, please drop us a mail at e-mail ID given below

Donate generously because your contribution will indeed make a difference. Your support in this regard is highly appreciated. Should you wish to have any more information, you can contact our “**Alumni Relations and Resource Generation Cell**”.

**Contact Persons:** -

|   |   |
|---|---|
| <b>Dr. Bidyut Majumdar</b><br>Chairman, Alumni Relations and Resource Generation Cell,<br>Department of Chemical Engineering, NIT Raipur<br>98260-51120<br>E-mail: <a href="mailto:chairman.arrgc@nitrr.ac.in">chairman.arrgc@nitrr.ac.in</a> | <b>Registrar</b><br><b>NIT Raipur</b><br>0771-2254700 (O) |
|---|---|

**Warm Regards.**

Director, NIT Raipur



## QUICK GLIMPSES



The first President of independent India honorable Dr. Rajendra Prasad laid the Foundation stone of the college building on 14th September 1956

In 1958-59 with the commencement of additional courses in Civil, Mechanical and Electrical Engineering the college came to be known as Government College of Engineering and Technology.



Established 32nd Ranked HPC system as listed under Top Supercomputers India List - the first entry amongst NITs in this elite list

National Institute of Technology Raipur has secured 67th position in Engineering Institutions of the all India annual-2020 National Institutional Ranking Framework (NIRF), which was announced by the Ministry of Human Resource Development (MHRD), Government of India, on 11th June 2020. NIT Raipur also stands 16th among 31 NITs in India







## Precautions For **Coronavirus**



Stay at home.



Wash your hands frequently with soap and clean, potable water.



In the absence of a tissue/handkerchief, cough or sneeze into your elbow.



Avoid touching your face.



Clean and disinfect surfaces regularly.



Practice social distancing.



Wear a mask.



Eat healthy.

Together we can fight C  VID-19!

**NATIONAL INSTITUTE OF TECHNOLOGY**

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