INSTITUTE RESEARCH FACILITIES – EXPERIMENTAL

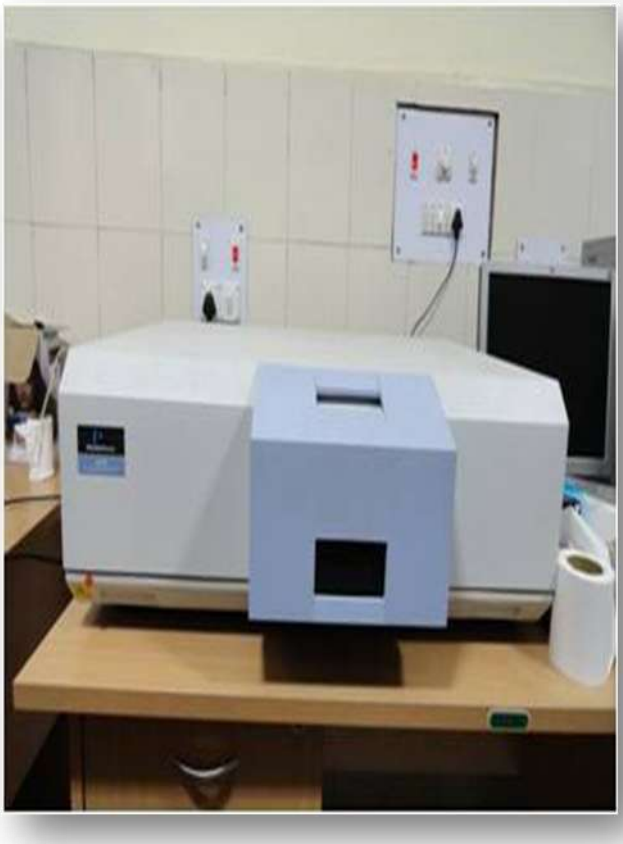
Central Research Facility (CRF)

FE-SEM SUPRA 55 WITH AIR LOCK, EDS, EBSD	
	The **Central Research Facility (CRF)** of ISM Dhanbad has installed **FE-SEM Supra 55** with **Air Lock** chamber for scientific research. Attachments available with the FE-SEM are Energy Dispersive Microanalysis (Oxford **Liquid Nitrogen free SDD X MAX 50 EDS**), Electron Backscatter Diffraction (Oxford **Integrated Advanced Aztec HKL EBSD** with forescatter detector system with 4 diodes for Nordlys Analysis). FE-SEM has resolution of 0.8 nm at 15 KV, and 1.6 nm at 1 KV; 12-1000000X magnification; 100V TO 30 KV acceleration voltage; and Schottky Field Emission Electron Gun. It has probe current ranging 12 pA to 100 nA. The detectors used are SE, In-Lens, BSE, Retractable STEM with Bright and dark field
	Contact: Dr. A. K. Bhaumik Phone: 0326 2235684 Cell: 0970194675 Email: ajoybhaumik@hotmail.com

SCANNING ELECTRON MICROSCOPE	
	To find out Surface morphology and chemical characterization.
	Contact: Dr. G. C. Nayek Phone: 0326 2235934 Cell: 07677666466 Email: gcnayak_bls@yahoo.co.in & Dr. (Ms) RashmiMadhuri Phone: 0326 2235935 Cell: 09471191640 Email: rshmmadhuri@gmail.com
SURFACE AREA & POROSITY METER ANALYZER	
	Surface area and pore volume measurement
	Contact: Dr. BiswajitChowdhury Phone: 0326 2235663 Cell: 09470194350 Email: biswajit_chem2003@yahoo.com & Dr. SumantaSahoo Phone: 0326 223 5936 Cell: 0763104224 Email: sumantchem@gmail.com

HOTOCHEMICAL REACTOR	
	Study and analysis of photochemical reactions. Contact: Dr. SomnathYadav Phone: 0326-223 5880 Cell: 09471191492 Email: s_yadav1975@yahoo.co.in
BINARY GPC- HPLC	
	Molecular weight determination of polymers and separation & purification of organic compounds Contact: Dr. Sagar Pal (for GPC) Phone: 0326 2235769 Cell: 09471191529 Email: sagarpal1@hotmail.com & Dr. SomnathYadav (for HPLC) Phone: 0326-2235880 Cell: 09471191492 Email: s_yadav1975@yahoo.co.in

GAS CHROMATOGRAPH WITH FIXED BED REACTOR	
	Online analysis of gas phase reaction Contact: Dr. BiswajitChowdhury Phone: 0326 223 5663 Cell: 09470194350 Email: biswajit_chem2003@yahoo.com
GAS CHROMATOGRAPH	
	Separation and analysis of volatile gas & liquid samples Contact: Dr. SumantaSahoo Phone: 0326 2235936 Cell: 07631042241 Email: sumantchem@gmail.com & Dr. ChanchalHaldar Phone: 0326 2235115 Cell: 08294289097 Email: haldar.c.ac@ismdhanbad.ac.in

UV-VISIBLE SPECTROPHOTOMETER	
	Quantitative determination of different analytes for solid and liquid samples.
	Contact: Dr. Rohit P. John Phone: 0326 223 5665 Cell: 09431711302 Email: rohithjohn@gmail.com
FLUORESCENCE SPECTROPHOTOMETER	
	Fluorescence study of different organic samples.
	Contact: Dr. SwapanDey Phone: 0326 223 5607 Cell: 09430191732 Email: deyswapan77@yahoo.com

POTENTIOSTAT

Corrosion Analysis

Contact
Dr. MahendraYadav
Phone: 0326 223 5428
Cell: 09431711185
Email: yadav_drmahendra@yahoo.co.in

ELECTROCHEMICAL IMPEDANCE AND CORROSION ANALYSIS

Corrosion Analysis

Contact:
Prof. G. Udayabhanu
Phone: 0326 2235461
Cell: 09431124542
Email: g_udayabhanu@hotmail.com

ELECTROCHEMICAL WORK STATION

Corrosion & electrochemical analysis

Contact:
Dr. MahendraYadav
Phone: 0326 2235428
Cell: 09431711185
Email: yadav_drmahendra@yahoo.co.in

DIFFERENTIAL SCANNING CALORIMETER	
	Thermal characterization Contact: Prof. N. M. Mishra Phone: 0326 223 5460 Cell: 09431121434 Email: nirendra_m@hotmail.com
DRUG DISSOLUTION APPARATUS	
	Drug delivery studies. Contact: Name: Dr. Sagar Pal Phone: 0326 2235769 Cell: 09471191529 Email: sagarpal1@hotmail.com

X-RAY FLOURESCENCE (XRF)

For geochemical analysis of major and trace elements of rocks

Contact:
Prof. D. Asthana
Phone: 0326 223 5424
Cell: 09431122641
E-mail: dasthana@hotmail.com

POLARISING PETROLOGICAL MICROSCOPE (TRANSMITTED LIGHT)

For mineralogical studies of rocks and minerals

Contact:
Dr. M. K. Mukherjee
Phone: 0326 2235472
Cell: 09431711148
E-mail:
mrinal_km67@yahoo.co.in

STEREO BINOCULAR MICROSCOPES

For micropaleontological study

Contact:
Dr. A. K. Bhaumik
Phone: 0326 2235684
Cell: 09431711148
E-mail:
ajoybhaumik@hotmail.com

UNIVERSAL MODEL RESEARCH MICROSCOPE

For mineralogical study

Contact:
Prof. A. S. Venkatesh
Phone: 0326 2235466
Cell: 09431125801
E-mail:
asvenkatesh@hotmail.com

MPV MICROSCOPE

For petrological study of coal

Contact:
Prof. A. K. Varma
Phone: 0326 2235449
Cell: 09431724156
E-mail: atulvarma@hotmail.com

LINKAM FLUID-INCLUSION (GEOTHERMOMETRY) MICROSCOPE

For thermometry of ores

Contact:
Prof. A. S. Venkatesh
Phone: 0326 2235466
Cell: 09431125801
E-mail: asvenkatesh@hotmail.com

RUSKA UNIVERSAL POROSIMETER

To measure the engineering properties of rocks and soils.

Contact:
Dr. R. K. Dubey
Phone: 0326 2235637
Cell: 09431711058
E-mail: rkdubey1085@hotmail.com

FRANKLIN DIRECT SHEAR TEST MACHINE

For measuring shear strength of rocks

Contact:
Dr. R. K. Dubey
Phone: 0326 2235637
Cell: 09431711058
E-mail: rkdubey1085@hotmail.com

POINT LOAD TESTER

To measure uniaxial compressive strength of rock (Indirect method)

Contact:
Dr. R. K. Dubey
Phone: 0326 2235637
Cell: 09431711058
E-mail: rkdubey1085@hotmail.com

SLAKE DURABILITY TESTING MACHINE

To study durability of rock under fluid action

Contact:
Dr. R. K. Dubey
Phone: 0326 2235637
Cell: 09431711058
E-mail: rkdubey1085@hotmail.com

LIQUID LIMIT DEVICE

To measure Liquid limit of soil.

Contact:
Dr. R. K. Dubey
Phone: 0326 2235637
Cell: 09431711058
E-mail: rkdubey1085@hotmail.com

PERMEAMETER

To measure permeability of soil.

Contact:
Dr. R. K. Dubey
Phone: 0326 2235637
Cell: 09431711058
E-mail: rkdubey1085@hotmail.com

OBSERVATIONAL SEISMOLOGY

(a)CMG-3T SENSOR

(b)CMG -DM24 DIGITIZER

(c) GPS

(d)BETTERY

(e) BETTERY

Study and analysis of seismic status of an area /district in order to assess seismic vulnerability and risk of the region for saving life and property of the public.

Contact:
Dr. P. K. Khan
Phone: 0326 2235465
Cell: 09431711020
Email:
pkkhan_india@yahoo.com

REMOTE SENSING, GIS, GPS AND WATERSHED MANAGEMENT

Analysis of satellite images for mineral/water resources inventory and management including land environmental assessment in a mining project area ie generation of thematic maps for exploration and exploitation strategy of resources. To manage surface as well as ground water for optimization.

Contact:
Prof. V. K. Srivastava
Phone: 0326 2235414
Cell: 09471191295
Email:
ism_vinay@yahoo.co.in

SEISMIC EQUIPMENT

24 Channel StrataVizor NZ. Provision of using blaster. The department has Accelerated Weight Drop as a source

Contact:
Prof. P. R. Mohanty
Phone: 0326 2235414
Cell: 09431125409
Email:
priyamohanty@hotmail.com

PETROPHYSICS

For measurement of Porosity and Permeability of Coal samples and Geomechanical modeling for CBM and Oil/gas Fields. This instrument can measure permeability from 0.01 md to 1 Darcy

Contact:
Dr. R. Chatterjee
Phone: 0326 2235493
Cell: 09431914215
Email: rima_c_99@yahoo.com

MAGNETOTELLURIC INVESTIGATION

Two MT equipment. It can be used for deep and shallow investigations both for geodynamics and metallogeny. The equipment can record in the range of 10000 Hz-10^{-5} Hz.

	Contact: Prof. Shalivahan Phone: 0326 2235475 Cell: 09471191496 Email: svismagp@yahoo.co.in

MAGNETOMETER	
	Magnetometers/gradiometer inbuilt GPS, GEM-made Canada (Resolution: 0.01 nT, Absolute Accuracy: +/- 0.2 nT @ 1 Hz
	Contact: Name: Dr. U. K. Singh. Phone: 0326 2235606 Cell: 09470194998 Email: upendrakrish@gmail.com
G-5 GRAVIMETER	
	Reading Resolution of 1 microgal. The instrument can be used following application: (i) Oil & Gas Exploration (ii) Mineral Exploration (iii) detection of Volcanic Massive Sulphides deposits (iv) Geological Mapping (v) Civil Engineering to study integrity of roads, dams, and dykes, looking for areas of weakness in the sub-surface (v) Geotechnical for detection Voids or Cavities (vi) Geoid Mapping (vii) Archaeology.

	Contact: Name: Dr. U. K. Singh. Phone: 0326 2235606 Cell: 09470194998 Email: upendrakrish@gmail.com

TIME DOMAIN ELECTROMAGNETIC

The equipment acquires data in the milli-second range.

Contact:
Name: Dr. S. K. Pal
Phone: 0326 2235496
Cell: 09471191852
Email:
sanjitism@gmail.com

FREQUENCY DOMAIN ELECTROMAGNETIC

The equipment can operate in the frequency of 110 Hz to 56 KHz.

Contact:
Name: Dr. S. K. Pal
Phone: 0326 2235496
Cell: 09471191852
Email: sanjitism@gmail.com

VERY LOW FREQUENCY ELECTROMAGNETIC

The equipment uses transmitters from various corners of the world in the KHz range. An additional advantage with the equipment is that the resistivity could also be measured

	Contact: Name: Dr. S. K. Pal Phone: 0326 2235496 Cell: 09471191852 Email: sanjitism@gmail.com

INDUCED POLARIZATION	
	The equipment can be used for base metal exploration using 3 KW generator.
	Contact: Name: Dr. S. K. Pal Phone: 0326 2235496 Cell: 09471191852 Email: sanjitism@gmail.com
RESISTIVITY IMAGING SYSTEM	
	Resistivity imaging system has the capability for 61 channels. The take outs are at 10 m interval.
	Contact: Name: Dr. S. K. Pal Phone: 0326 2235496 Cell: 09471191852 Email: sanjitism@gmail.com

X-RAY DIFFRACTOMETER	
	X-ray diffractometer is used for structural determination and phase identification of the materials.
	Contact: Prof. J. Manam Phone: 0326 2235439 Cell: 09471192138 Email: jairam_manam@yahoo.co.in
FTIR Spectrometer	
	FTIR spectrometer is used for determination of functional groups of the materials in bulk or thin film form.
	Contact: Prof. J. Manam Phone: 0326 2235439 Cell: 09471192138 Email: jairam_manam@yahoo.co.in

THERMOLUMINESCENCE ANALYZER

Thermoluminescenceanalyzer is used to study the thermoluminescence phenomena, characterize different defects and identify different trap levels produced after energetic particle radiation/ionizing radiation.

Contact:
Prof. J. Manam
Phone: 0326 2235439
Cell: 09471192138
Email:
jairam_manam@yahoo.co.in

UV-VIS Spectrophotometer

UV-VIS Spectrophotometer is used for absorption, transmission and reflection measurement of the materials. Integrating sphere is used for diffuse reflectance measurement of powder samples. The above optical studies provide the information about the band structure and band gap of the materials.

Contact:
Dr. S.K. Sharma
Phone: 0326 2235412
Cell: 09431121600
Email:
sksharma_ism@yahoo.co.in

FLUORESCENCE SPECTROPHOTOMETER

Fluorescence Spectrophotometer is used to study the photoluminescence phenomenon and to get the idea about the radiative/non radiative transitions of dopant / host matrix.

Contact:
Dr. S.K. Sharma
Phone: 0326 2235412
Cell: 09431121600
Email:
sksharma_ism@yahoo.co.in

LCR METER

LCR meter measures the dielectric properties as a function of temperature and frequency

Contact:
Dr. R.B. Choudhary
Phone: 0326 2235881
Cell: 09471191381
Email: rbchec@yahoo.co.in

MONOCHROMATOR, PHOTO MULTIPLIER TUBE, LASER SOURCE

The arrangement of Monochromator, Photo multiplier tube and Laser source is used to study Photoluminescence/ Up-conversion phenomena.

Contact:
Dr. V.K. Rai
Phone: 0326 2235404
Cell: 09470194790
Email: vineetkrrai@yahoo.co.in

HIGH TEMPERATURE FURNACE

High Temperature Furnace is used for Controlled annealing/ sintering of materials upto 1300°C

Contact:
Dr. P.M. Sarun
Phone: 0326 2235887
Cell: 09471191816
Email: sarunpm@gmail.com

SPIN COATING UNIT

Spin Coating Unit is used for deposition of monolayer /multilayer thin films of different organic and inorganic thin film with variable thickness controlled by rotation speed.

Contact:
Prof. P.S. Gupta
Phone: 0326 2235236
Cell: 09334010387
Email: psgupta2ism@yahoo.co.in

LANGMUIR BLODGETT APPARATUS

Langmuir Blodgett Apparatus is used for deposition of monolayer /multilayer of organic & inorganic compounds

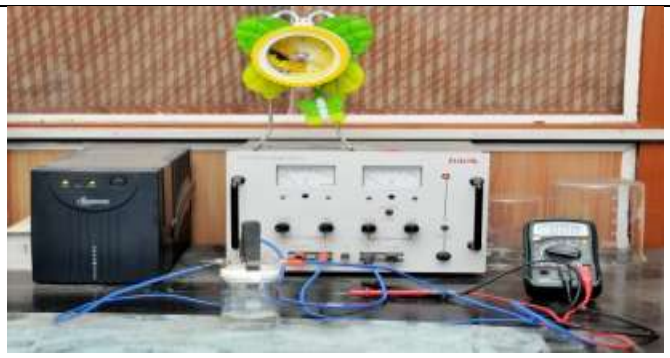
Contact:
Prof. P.S. Gupta
Phone: 0326 2235236
Cell: 09334010387
Email: psgupta2ism@yahoo.co.in

DIP COATING UNIT

Dip Coating Unit is used for deposition of monolayer /multilayer thin films

Contact:
Prof. P.S. Gupta
Phone: 0326 2235236
Cell: 09334010387
Email: psgupta2ism@yahoo.co.in

ELECTRO-DEPOSITION UNIT



Electro-deposition unit is used for deposition of thin films by changing the applied voltage and time.

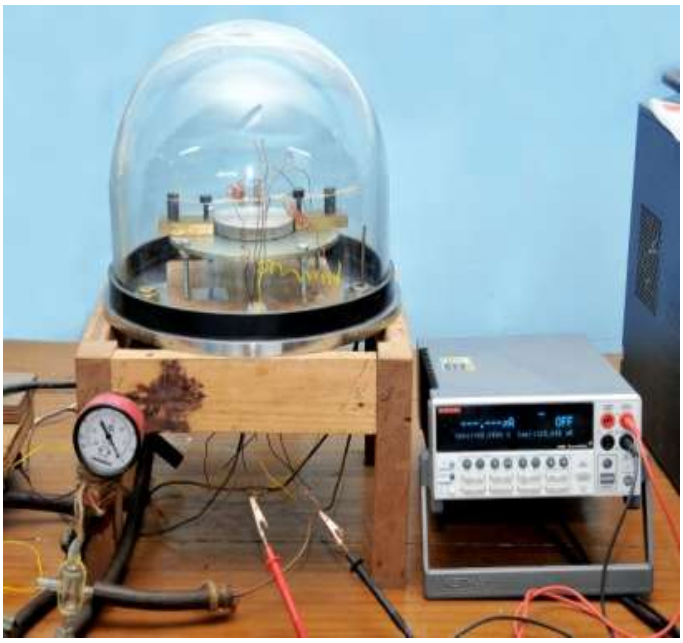
Contact:
Dr. A.K. Kar
Phone: 0326 2235403
Cell: 09470194803
Email: kar.ak.ap@ismdhanbad.ac.in

MILLI-Q WATER PURIFICATION APPARATUS

Milli-Q water purification Apparatus is used for ultrapure water system having pH □5.8 and resistivity 18 MΩcm.

Contact:
Prof. P.S. Gupta
Phone: 0326 2235236
Cell: 09334010387
Email: psgupta2ism@yahoo.co.in

SOURCE METER



Source meter is used for I-V characteristics at different temperature. It can also be used for gas sensing application.

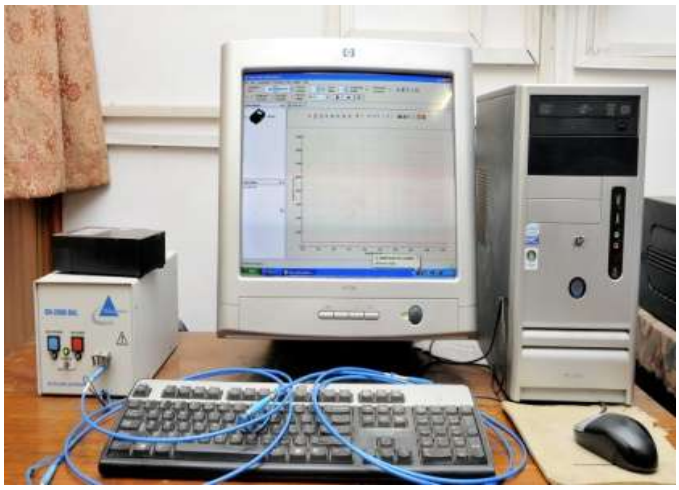
Contact:
Prof. P. S. Gupta
Phone: 0326 2235236
Cell: 09334010387
Email: psgupta2ism@yahoo.co.in

LOW TEMPERATURE SAMPLE HOLDING ARRANGEMENT

Low temperature sample holding arrangement can be used for holding the samples during various electrical properties measurements in low temperature range.

Contact:
Prof. P.S. Gupta
Phone: 0326 2235236
Cell: 09334010387
Email: psgupta2ism@yahoo.co.in

UV-VIS SPECTROPHOTOMETER



For absorption, transmission and diffuse reflectance studies, Band gap determination

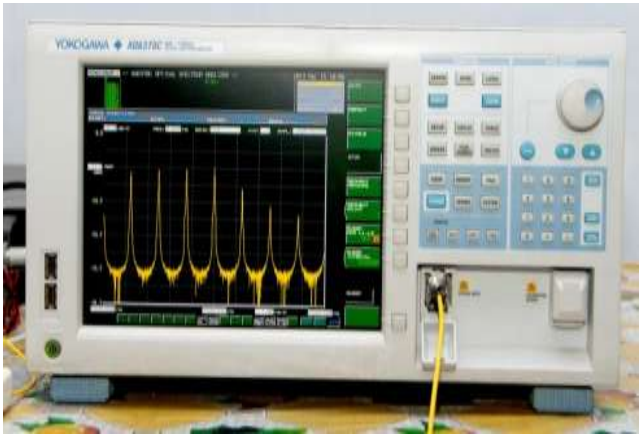
Contact:
Dr. A.K. Kar
Phone: 0326 2235403
Cell: 09470194803
Email: kar.ak.ap@ismdhanbad.ac.in

DIRECT CORE MONITORING OPTICAL FIBRE FUSION SPLICER

Direct core monitoring optical fibre fusion splicer is used for splicing of different types of fiber.

Contact:
Dr. V. K. Singh
Phone: 0326 2235641
Cell: 09471191037
Email: vksinghism@yahoo.com

OPTICAL SPECTRUM ANALYZER



Optical spectrum analyzer is used for analysis of spectrum in the wavelength range 600-1700 nm.

Contact:
Dr. V. K. Singh
Phone: 0326 2235641
Cell: 09471191037
Email: vksinghism@yahoo.com

LASER SOURCES

Laser sources available for wavelengths - 800 nm, 980 nm, 1310 nm, and 1550 nm.

Contact:
Dr. V. K. Singh
Phone: 0326 2235641
Cell: 09471191037
Email: vksinghism@yahoo.com

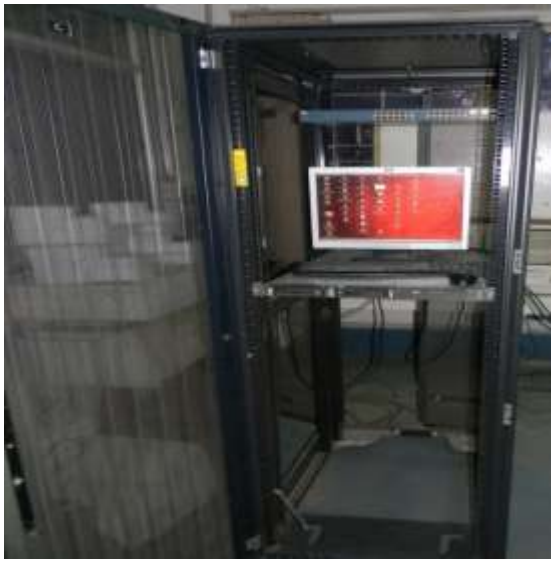
SUPERLUMINESCENCE DIODE

This is a Broadband source working in the near IR region.

HP SERVER TC2120 PENTIUM IV (2 NO.S)

Contact:
Prof. A. K. Nirala
Phone: 0326 2235483
Cell: 09431125123
Email: aknirala@gmail.com

<table>
<tr><td>  </td><td>To develop the programming languages.</td></tr>
<tr><td></td><td>Contact:
Mr. R. Pamula
Phone: 0326 2235273
Cell: 09431953938
Email: rajendrapamula@gmail.com</td></tr>
<tr><td colspan="2">IBM SERVER (235 XEON SERVER)</td></tr>
<tr><td>  </td><td>Window Server 2003, MATLAB window version server, MATLAB license server, QualNet license server</td></tr>
<tr><td></td><td>Contact:
Mr. R. Pamula
Phone: 0326 2235273
Cell: 09431953938
Email: rajendrapamula@gmail.com</td></tr>
<tr><td colspan="2">HP Proliant Server (ML 350e Gen 8)</td></tr>
</table>

<table>
<tr><td>  </td><td>MATLAB license server, QualNet License server</td></tr>
<tr><td></td><td>Contact:
Mr. R. Pamula
Phone: 0326 2235273
Cell: 09431953938
Email: rajendrapamula@gmail.com</td></tr>
<tr><td>HP Proliant Server(DL 360) and IBM Server (236 Xeon Server)
  </td><td>Redhat Linux Server</td></tr>
<tr><td></td><td>Contact:
Mr.Dipankar Ray
Phone: 0326 2235454
Cell: 09471191359
Email: dpnkray@yahoo.co.in</td></tr>
<tr><td colspan="2">LAN PROTOCOL SIMULATOR</td></tr>
<tr><td>  </td><td>LAN Protocol Simulator for existing & new developments.</td></tr>
<tr><td></td><td>Contact:
Mr. R. Pamula
Phone: 0326 2235273
Cell: 09431953938
Email: rajendrapamula@gmail.com</td></tr>
</table>

POTENTIOMETRIC AUTO TITRATOR	
	Potentiometric titration for all chemical, food, pulp & paper, petrochemicals, pharmaceuticals industries etc
	Contact: Mr. Sachin Paul Phone: 0326 2235288 Cell: 09835321743 Email: sachinpaulism@gmail.com
RHEOPLUS RHEOMETER	
	Flow behavior of Adhesives, Glues, Coatings, Paints, Colloids, Detergents, Surfactants, Emulsions, Explosives, Fragrances, Inks, Toners oil, slurry, etc.
	Contact: Mr. Suresh Kumar Yatirajula Phone: 0326 2235906 Cell: 09471191341 Email: suresh.828@gmail.com
ZETASIZER, NANO	
	Nano particle size analysis for proteins, emulsion, pigments, toners, liquid inks, waste water, drinking water etc.
	Contact: Mr. Sachin Paul Phone: 0326 2235288 Cell: 09835321743 Email: sachinpaulism@gmail.com

TENSIOMETER

Wetting measurements like Contact angle, interfacial tension of liquid drop for quality control.

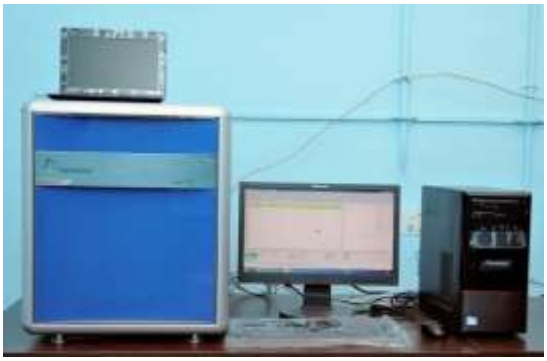
Contact:
Mr. Suresh Kumar Yatirajula
Phone: 0326 2235906
Cell: 09471191341
Email: suresh.828@gmail.com

VARIO MICRO CUBE

Elemental composition (C,H,N,S,O,Cl) in coal,coke, oil, protein, food, soil, dyes, pigments etc.

Contact:
Prof.V K Saxena
Phone: 0326 2235455
Cell: 09431124410
Email: vksaxenaism@hotmail.com

TOC SELECT

	To measure total organic carbon of water, pharmaceuticals, waste water, and other liquids.
	Contact: Prof.V K Saxena Phone: 0326 2235455 Cell: 09431124410 Email: vksaxenaism@hotmail.com

Gas Chromatograph	
	Gas composition of natural gas, mine Gas, , Flue Gas etc.
	Contact: Mr. Sachin Paul Phone: 0326 2235288 Cell: 09835321743 Email: sachinpaulism@gmail.com

CLEAN ENERGY TRAINER

The Clean Energy Trainer comprises of (i) 2 solar modules; (ii) Wind Generator (iii) 2 electrolyzers (iv) Fuel cell stack(v) USB data monitor and(vi) Clean Energy Trainer software.

With Clean Energy Trainer both individual components and entire energy conversion chain can be investigated using of renewable energies.

Contact:
Dr. KalyanChatterjee
Phone: 0326 2235487
Cell: 09431126489
Email: kalyanbit@yahoo.co.in

MICRO-COMPUTER BASED CONTROLLER FOR LOAD FREQUENCY CONTROL

This setup controls the speed of a motor(act as a prime mover) during change of the load in alternator with fixed frequency at 50 Hz.

Contact:
Dr. Kalyan Chatterjee
Phone: 0326 2235487
Cell: 09431126489
Email: kalyanbit@yahoo.co.in

FAULT SIMULATOR	
	Fault Simulator is used to simulate faults on a connected power system. The connected power system may include Generators, Transformers, Transmission lines, motors, etc. Different kinds of faults such as Line to Ground (L-G), Line to Line (L-L), Double line to ground (L-L-G) and three phase symmetrical faults can be analyzed by the simulator.
	Contact: Dr. Biplab Bhattacharyya Phone: 0326 2235418 Cell: 09431711085 Email: biplabrec@yahoo.com
TRANSFORMER OIL TESTING KIT	
	This set is useful for testing dielectric strength of the insulating oils normally used the distribution and high voltage transformers.
	Contact: Prof. P.K.Sadhu Phone: 0326 2235478 Cell: 09431126076 Email: pradip_sadhu@yahoo.co.in

MEASUREMENT OF A, B, C, D CONSTANTS OF A TRANSMISSION LINE

From this setup we can measure ABCD parameters for long transmission line and study Ferranti effect.

Contact:
Prof. P.K.Sadhu
Phone: 0326 2235478
Cell: 09431126076
Email: pradip_sadhu@yahoo.co.in

POWER TRANSFER THOUGH A TRANSMISSION LINE SYSTEM

Hardware simulation of active & reactive power flow through transmission line system under steady state condition.

	Contact: Prof. P.K.Sadhu Phone: 0326 2235478 Cell: 09431126076 Email: pradip_sadhu@yahoo.co.in

NUMERICAL OVER CURRENT RELAY AND EARTH FAULT RELAY

	Microprocessor basedNumerical over current protective relay. A wide range of protective characteristics and true rmscurrent measurement are available. Contact: Dr. KalyanChatterjee Phone: 0326 2235487 Cell: 09431126489 Email: kalyanbit@yahoo.co.in

Numerical Over Voltage Relay

	Microprocessor based Numerical over voltage protective relay. A wide range of protective characteristics and true rmsvoltage measurement are available. Contact: Dr. KalyanChatterjee Phone: 0326 2235487 Cell: 09431126489 Email: kalyanbit@yahoo.co.in

DISSECTIBLE MACHINE

The unique character of the dissectible machine system enables to construct and investigate over fifty different machine assemblies.
The system would be used for study over a wide range of topics from the principles of magnetic circuits and electrical machine theory to three phase synchronous machines.

Contact:
Dr. V. Mukherjee
Phone: 0326 2235644
Cell: 09471191127
Email:
vivek_agamani@yahoo.com

STATCOM

A STATCOM is a voltage source converter (VSC)-based device, with the voltage source behind a reactor. The voltage source is created from a DC capacitor and therefore a STATCOM has very little active power capability.

Contact:
Dr. TanmoyMaity
Phone: 0326 2235729
Cell: 09471191126/
Email:
tanmoy_maity@rediffmail.com

Contact:
Dr. V. Mukherjee
Phone: 0326 2235644
Cell: 09471191127
Email:
vivek_agamani@yahoo.com

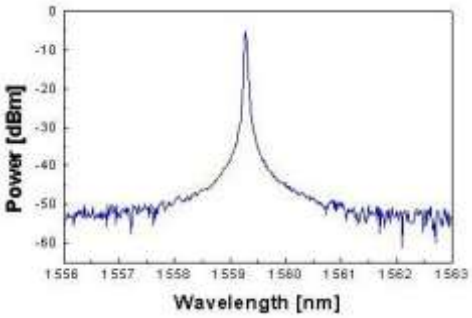
SPECTRUM ANALYZER

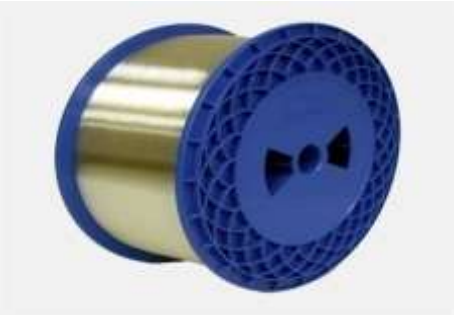
Frequency analysis of electrical signal frequency range 9 kHz to 3 GHz.

Contact:
Dr. S.Mandal
Phone: 0326 2235405
Cell: 09470194782
Email: sanjoy_ism@yahoo.in

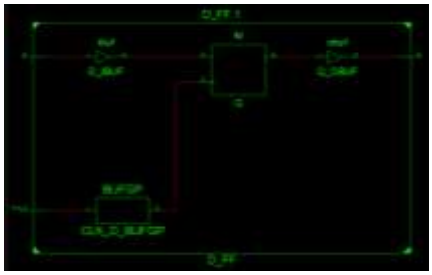
<table>
<tr><th colspan="2">LIGHT RUNNER</th></tr>
<tr><td rowspan="2">  </td><td>Light Runner is an integrated modular system that can be used for test and measurementsrelated to dispersion, attenuation, EDFA, 4-channel WDM, OTDR, FBG, BER, Eye Pattern and OADM.</td></tr>
<tr><td>Contact :
Prof. Vishnu Priye
Phone: 0326 2235453
Cell: 09431125155
Email: vish.ism99@gmail.com</td></tr>
<tr><th colspan="2">SPLICE MACHINE</th></tr>
<tr><td rowspan="2">  </td><td>Sumitomo splice machine is used join together two fibers with about 0.1 dB loss. It is being used to splice SMF-SMF, SMF-MMF, MMF-MMF, SMF-EDFA, SMF or MMF – PCF.</td></tr>
<tr><td>Contact :
Prof. Vishnu Priye
Phone: 0326 2235453
Cell: 09431125155
Email: vish.ism99@gmail.com</td></tr>
</table>

OPTICAL SPECTRUM ANALYZER	
	Used to measure spectrum of optical signal from 600 nm – 1700 nm. Research on optical amplifiers, lasers and others can be performed.
	Contact : Prof. Vishnu Priye Phone: 0326 2235453 Cell: 09431125155 Email: vish.ism99@gmail.com
LOCK IN AMPLIFIER	
	Used to measure low level signals by locking to a known frequency. Power and phase can be measured simultaneously
	Contact : Prof. V. Kumar Phone: 0326 2296651 Cell: 09431122030 Email: vkumar52@hotmail.com
	**Monochromator** Used along with a broadband source to obtain a monochromatic optical beam. It can be tuned to wide range of wavelengths.

	Contact : Prof. V. Kumar Phone: 0326 2296651 Cell: 09431122030 Email: vkumar52@hotmail.com
OTDR	
	Loss and fault measurement of fiber cables by optical time domain reflection measurement. A very useful device.
	Contact : Prof. V. Kumar Phone: 0326 2296651 Cell: 09431122030 Email: vkumar52@hotmail.com
OPTICAL SOURCES	
   DFB Laser Spectrum	Laser Diodes at 1550 nm, 980 nm & 1480 nm. The LD at 1550 nm is used as signal and high power 980 nm and 1480 nm lasers are used as pump for EDFA. A DFB Laser at 1550 nm is used for precise measurement. A tunable laser diode in C Band is available to characterize any photonic device especially EDFA and FBGs.
	Contact : Prof. Vishnu Priye Phone: 0326 2235453 Cell: 09431125155 Email: vish.ism99@gmail.com

OPTICAL FIBERS	
	Different categories of fibers are available in the lab such as – SMF at 1310 nm & 1550 nm, MMF, and EDFs.
	Contact : Prof. Vishnu Priye Phone: 0326 2235453 Cell: 09431125155 Email: vish.ism99@gmail.com
FIBER TERMINATION KIT	
	To terminate a fiber with a connector is an art as well as a high level technology. Fiber Termination kit and expetrize is available in the department.
	Contact : Prof. V. Kumar Phone: 0326 2296651 Cell: 09431122030 Email: vkumar52@hotmail.com

VLSI design - Xilinx ISE DesignSuite; Tanner EDA tools; LASI



Complex digital systems can be implemented in FPGAs with the help of ISE Design Suite (System addition).

Tanner tool is helpful in electronic circuit simulations and circuit layout.

LASI is used for layout and analysis of complicated circuits. Design rule checker (DRC) in LASI can be made user defined dpending on various technological nodes.

Contact:
Dr. SUBINDU KUMAR
Phone: 0326 2235732
Cell: 09471191160
Email: subindukumar@yahoo.com

DIGITAL SIGNAL PROCESSING KITS

A number of fixed and floating point *DSP starter kits* (*TMS320C6713* and *TMS320C6416*) are available and being used for real-time implementation of communication systems, speech processing, echo and noise cancellation.

FPGA Boards

A number of *Atlys* boards (from *Digilent*) are also being used for implementation of DSP systems in real-time.

In order to work with DSP kits and FPGA boards, *MATLAB* software (from *Mathworks*) with a number of tool-boxes and *Xilinx ISE Design Suite* has been purchased and available in the DSP laboratory.

Contact :
Prof. S. Bhattacharya
Phone : 0326 2235457
Cell : 09431711156
E-mail: subratabh@yahoo.com

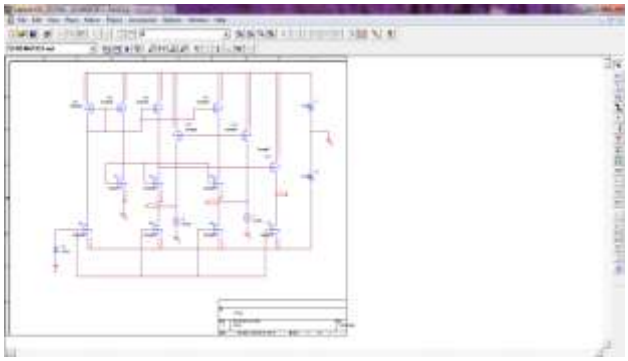
USRP HARDWARE PLATFORM

The Universal Software Radio Peripheral (USRP- 2922) pair SDR hardware platform which implements radio front-end-functionality to PC/Laptop, high speed ADC/DAC and FPGA based DDC/DUC support for IF processing motherboard can be interfaced to MATLAB/Simulink LabView/GNU for real-world signal processing of radio bands from 400 MHz to 4.4 GHz covering cellular, GNSS, WiFi, and L-band radar: designing wireless communication systems including OFDM/MIMO, Cognitive Radio research and experiments.

Contact :
Prof. Debjani Mitra
Phone : 0326 2206866
Cell: 09430132055
E-mail: debjani7@yahoo.com

CADENCE ORCAD

Circuit design in OrCAD Capture



Frequency Analysis of the previous circuit in Capture

OrCAD is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards. Orcad family products offer a total solution for core design tasks: Schematic, Verilog, VHDL-based design entity, digital, analog, and mixed -signal simulation, and printed circuit board layout. There is some features of OrCAD family products.

1. Cadence OrCAD Capture: Capture is the most widely used schematic design solution, supporting both flat and hierarchal designs from the simplest to the most complex.

2. Cadence OrCAD PSpice: PSpice is a full-featured, native analog and mixed-signal circuit simulator, used in conjunction with PSpice A/D, PSpice Advanced Analysis tools help designers improve yield, and reliability of their designs.

Experimental Setup

Response curve of the previous setup

This research lab contains few instruments to carry out experimental verification of the circuits which are designed using OrCAD software. Some of the basic instruments such as power supply, function generator, oscilloscope etc are available in this lab as shown in the experimental setup below.

Contact :
Prof S. K. Paul
Phone: 0326 2235244
Cell: 09471191520
Email: sajalkpaul@rediffmail.com

COMMUNICATIONS & SIGNAL PROCESSING

MATLAB software with different tool boxes and hardware such as Xilinx ISE DesignSuite are used for simulation and real time implementation of DSP system specially for speech processing, image processing echo and noise cancellation.

Contact :
Prof S. Bhattacharya
Phone: 0326 2235457
Cell: 09431711156
Email: subratabh@yahoo.com

MICROWAVE SIGNAL GENERATION & DETECTION

Signal Generator

Spectrum Analyzer

Power Meter

20 GHz Signal Generator

To generate microwave signal upto 20 GHz.

18 GHz Spectrum analyzer

To study and characterize the frequency response upto 18 GHz of microwave devices

20 GHz Power Meter

To measure microwave power upto 20 GHz.

These three equipment are used to test and characterize any microwave component/device.

Contact:
Dr Sushrut Das
Phone: 0326 2235496
Cell: 09430374392
Email**:** sushrut_das@yahoo.com

ATOMIC ABSORPTION SPECTROPHOTOMETER (AAS)

Used for analysis of heavy metals in solution. It is used for the assessment of heavy metal pollution in air, water, soil, biological samples, solid waste, and hazardous waste.

Contact:
Prof S. K. Maiti
Phone: 0326 2235467
Cell: 09471191278
Email:
subodh_maiti@yahoo.com

GAS CHROMATOGRAPH

Used for analysis of organic compounds (like pesticides, herbicides), Volatile organic acids, gases (CH_4, CO_2etc), Polyaeromatic hydrocarbons (PAHs) in air, water, soil etc.

Contact:
Dr. S K Gupta
Phone: 0326 223547
Cell: 09431126495
Email: skgsunil@gmail.com

ELEMENTAL ANALYZER	
	Use for the determination of C,H,N,S,O in solid samples, like soil, solid waste, hazardous waste, coal etc. Contact: B K Mishra Phone: 0326 2235752 Cell: 09471191704 Email: bkmishra3@rediffmail.com

TOC ANALYSER

Used for analysis of organic carbon in liquid samples. Wastewater sampling having high BOD & COD. Drinking water samples can also be analysed.

Contact:
Dr. S K Gupta
Phone: 0326 2235474
Cell: 09431126495
Email: skgsunil@gmail.com

ZETA POTENTIAL ANALYZER

Zeta-Meter System 4.0 measures electrophoretic mobility and zeta potential of water and wastewater system. It works on the principle of microelectrophoresis. Used for optimization of coagulant dose in water and wastewater treatment practices.

Contact:
Dr. Alok Sinha
Phone: 0326 2235610
Cell: 09471518560
Email: aloksinha11@ yahoo.com

UNIVERSAL TRINOCULAR RESEARCH MICROSCOPE	
	Used for capturing images of biological samples by transmitted mode, and opaque samples by incident mode. Equipped with universal condenser (BF, Df, PH and DIC), with blue and green fluorescence facilities.
	Contact: Prof S. K. Maiti Phone: 0326 2235467 Cell: 09471191278 Email: subodh_maiti@yahoo.com

TRINOCULAR STEREOZOOM MICROSCOPE

Used for stereo zoom photography of opaque sample, works on cold light illumination. Mostly used for spore, dust analysis etc.

Contact:
Prof S. K. Maiti
Phone: 0326 2235467
Cell: 09471191278
Email: subodh_maiti@yahoo.com

TCLP APPARATUS

Zero head space extractor, dispensing pressure vessels, Rotary Agitator &Hazardous Waste Pressure Filtration System**.**

Designated by the USEPA as a suitable apparatus for Toxicity Characteristic Leaching Procedure (TCLP) using EPA Method 1311. This filtration apparatus separates solid and liquid phases of waste samples.

	Contact: Prof S. K. Maiti Phone: 0326 2235467 Cell: 09471191278 Email: subodh_maiti@yahoo.com

LABORATORY JAW CRUSHERS

Description: Our Jaw Crushers are laboratory versions of the industrial jaw crushers, which are extensively used for hard rock crushing, and can crush ore particles of up to 2½ inch size and can produce product of less than 1½ inch. Jaw crushers with both corrugated and smooth liners are available.

Contact:
Prof. S. Bhattacharya
Phone: 0326 2235440
Cell: 09431120001
Email: bhattac1957@yahoo.co.in

LABORATORY ROLL CRUSHERS

Description: The laboratory roll (smooth double roll) crushers are generally used for size reduction of softer, less abrasive ores and coal. Our roll crushers can crush a material with top size of up to 1 inch and can produce a material as fine as –0.5 mm.

Contact:
Prof. S. Bhattacharya
Phone: 0326 2235440
Cell: 09431120001
Email: bhattac1957@yahoo.co.in

VERTICAL ROTARY CRUSHER

Description: The laboratory vertical rotary crusher is generally used for size reduction of coal. It can crush coal of up to 5 inch size to give a product of less than 1½ inch size with significant generation of fine (–0.5 mm) particles.

Contact:
Prof. S. Bhattacharya
Phone: 0326 2235440
Cell: 09431120001
Email: bhattac1957@yahoo.co.in

SIZER (LABORATORY MODEL)

Description: The laboratory model sizer is generally used for size reduction of coal. It can crush coal of up to 2 inch size to give a product of less than ½ inch size with lesser generation of fines (–0.5 mm).

Contact:
Prof. S. Bhattacharya
Phone: 0326 2235440
Cell: 09431120001
Email: bhattac1957@yahoo.co.in

LABORATORY BALL MILL

Description: The laboratory ball mill is used for grinding of ores through repeated impacts, and to some extent through attrition, by steel balls. Depending upon the nature of the material and the grinding parameters, it can grind a material to less than 100 microns size or even finer.

Contact:
Dr. P. Gajbhiye
Phone: 0326 2235757
Cell: 09771457921
Email: prati4u@gmail.com

Laboratory Vibrating Mill

Description: The vibrating mill is used for pulverizing of small amounts of samples through repeated collisions and abrasion on surfaces of steel balls, imparted to the system through rapid vibrations. Depending upon the nature of the material and the duration, it can grind a material to less than 75 micron.

Contact:
Dr. P. Gajbhiye
Phone: 0326 2235757
Cell: 09771457921
Email: prati4u@gmail.com

SAMPLING FACILITY

Description: The sampling facilities in the department allows for drawing of representative samples from up to a few tons of the material. Crucial to every laboratory analysis, it is mostly carried out manually.

Contact:
Mr. AnandAnupam
Phone: 0326 2235922
Cell: 09162343434
Email: anand.anupam@live.in

COAL AND ORE PULVERIZING FACILITY

Description: The pulverizing facility comprising of multiple pulverizers for coal and ores can produce fine particles of sizes less than 75 microns. This facility is employed for most analyses of coal and grade related analyses of ores.

Contact:
Mr. AnandAnupam
Phone: 0326 2235922
Cell: 09162343434
Email: anand.anupam@live.in

SCREEN AND SIEVE ANALYSIS FACILITIES	
	Description: These are used for determining the size distribution. The measureable range is from 38 microns to 150 mm. Both dry and wet sieving facilities are available over the entire measurement range. Screens/sieves with square apertures are available for the entire range; round apertures are also available for the coarser sizes.
	Contact: Mr. AnandAnupam Phone: 0326 2235922 Cell: 09162343434 Email: anand.anupam@live.in

BOND WORK INDEX BALL MILL	
	Description: It is used to determine the standard Bond's Work Index of materials. The index is widely applied in comminution testing and selection.
	Contact: Mr. AnandAnupam Phone: 0326 2235922 Cell: 09162343434 Email: anand.anupam@live.in

HardgroveGrindability Index (HGI) Apparatus

Description: It is used to determine the ease of grinding of coal and other softer ores with respect to a standard coal sample.

Contact:
Mr. AnandAnupam
Phone: 0326 2235922
Cell: 09162343434
Email: anand.anupam@live.in

COKE MAKING PROPERTIES ANALYSIS FACILITY

Description: This facility is used to assess the coking properties of coal or coal blend and is used to characterize coals on the basis of their coke making ability. Such analyses include tests for Caking Index, Crucible Swelling Number, etc.

Contact:
Dr. Shalini Gautam
Phone: 0326 2235650
Cell: 0947191399
Email: shalini_ism@rediffmail.com

SIMULTANEOUS TG-DTA/DSC APPARATUS

Description: It is used to measure the changes in physical and chemical properties, enthalpy changes, or phase changes occurring in a sample with increase in temperature.

Contact:
Mr. Shatrughan Soren
Phone: 0326 2235652
Cell: 09939707967
Email: ssoren24@gmail.com

PROXIMATE ANALYSIS FACILITY

Description: This facility is used to determine the contents of fixed carbon, ash, volatile matter and moisture of coal, coke, graphite, fly ash, etc. Proximate Analysis is fast and effective tool for determining the quality of coal or similar materials.

Contact:
Mr. AnandAnupam
Phone: 0326 2235922
Cell: 09162343434
Email: anand.anupam@live.in

CHNS & O ELEMENT ANALYSER

Description: This apparatus carries out the ultimate analysis of coal and gives the composition of coal in terms of the following elements – Carbon, Hydrogen, Nitrogen, Sulfur& Oxygen.

Contact:
Prof. V. K. Saxena
Phone: 0326 2235455
Cell: 09431124410
Email: vksaxenaism@hotmail.com

BOMB CALORIMETER	
	It determines the calorific value, i.e., the amount of heat generated on complete combustion of a unit mass, of solid fuels. It gives the results as GCV (Gross Calorific Value). Contact: Prof. V. K. Saxena Phone: 0326 2235455 Cell: 09431124410 Email: vksaxenaism@hotmail.com

LOW TEMPERATURE GRAY KING ASSAY FURNACE

	Description: This specialized furnace is used to carry out Low Temperature Gray King Assay on coking coal samples. The assay results are used to assess the coke forming ability of a coking coal.
	Contact: Prof. V. K. Saxena Phone: 0326 2235455 Cell: 09431124410 Email:vksaxenaism@hotmail.com

MICUM INDEX APPARATUS	
	Description: This apparatus is used to determine the Micum index of coke which represents its strength with respect to both impacts and abrasion.
	Contact: Dr. Shalini Gautam Phone: 0326 2235650 Cell: 09471191399 Email: shalini_ism@rediffmail.com

Atomic Absorption Spectrophotometer	
	Description: AAS is used to determine the elemental composition after making a solution of the solid sample. It works on the principle of atomic absorption.
	Contact: Mr. Shatrughan Soren Phone: 0326 2235652 Cell: 09939707967 Email: ssoren24@gmail.com

FLOAT-SINK/HEAVY LIQUID SEPARATION TESTS FACILITY

Description: This facility is used to determine the density distribution of a coal/ore sample. The results are used in washability analysis of the sample as well as for the performance analysis of gravity separators.

Contact:
Mr. AnandAnupam
Phone: 0326 2235922
Cell: 09162343434
Email: anand.anupam@live.in

CHEMICAL ANALYSIS FACILITY

Description: This facility is used to carry out chemical assays of ores and other tests required in mineral engineering.

Contact:
Mr. Shatrughan Soren
Phone: 0326 2235652
Cell: 09939707967
Email: ssoren24@gmail.com

DAVIS TUBE MAGNETIC SEPARATOR

This apparatus is used to determine the ferro-magnetic material content in a sample. Crucial for magnetic separation, it may also be useful in other cases where such materials are used.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email:pankaj.k.jain@live.com

ZETA POTENTIAL ANALYSER

Description: This apparatus is used to determine the zeta potential of solid surfaces and is therefore finds application in all surface chemistry applications such as froth flotation, flocculation, etc.

Contact:
Prof. N. R. Mandre
Phone: 0326 2235456
Cell: 09431126113
Email: n_r_mandre@yahoo.com

VIBRATING SCREEN	
	Description: It is a laboratory version of industrial vibrating screens.
	Contact: Mr. AnandAnupam Phone: 0326 2235922 Cell: 09162343434 Email: anand.anupam@live.in

HYDROCYCLONE WITH TEST RIG (CUSTOM MADE)	
	Description: It is used for pilot-plant scale testing with hydrocyclones and can be used to develop new designs of hydrocyclones.
	Contact: Prof. N. Suresh Phone: 0326 2235442 Cell: 09431126465 Email: snikkam2002@yahoo.com

KHD Coal Jig	
	Description: It is carried out to perform laboratory scale beneficiation testing of coal samples on the principles of jigging.
	Contact: Prof. S. Bhattacharya Phone: 0326 2235440 Cell: 09431120001 Email: bhattac1957@yahoo.co.in

MOZLEY MINERAL SEPARATOR	
	Description: This is used to carryout beneficiation studies on a sample utilizes the principles of flowing film separation.

	Contact: Mr. P. K. Jain Phone: 0326 2235094 Cell: 07766904994 Email: pankaj.k.jain@live.com

BARTLES-MOZLEY LABORATORY VANNER	
	This is used to carryout beneficiation studies on a sample utilizes the principles of flowing film separation.
	Contact: Mr. P. K. Jain Phone: 0326 2235094 Cell: 07766904994 Email: pankaj.k.jain@live.com

MULTI GRAVITY SEPARATOR	
	Description: It is a type of enhanced centrifugal separator utilized for beneficiating ores with very difficult washing characteristics.
	Contact: Prof. N. Suresh Phone: 0326 2235442 Cell: 09431126465

	Email: snikkam2002@yahoo.com

FROTH FLOTATION CELLS

Description: They are used for carrying out laboratory scale froth flotation studies and release analysis.

Contact:
Prof. R. Venugopal
Phone: 0326 2235225
Cell: 09334003523
Email: vrayasam@yahoo.com

Wet Drum Magnetic Separator

This separator is used to carry out continuous low intensity magnetic separation of highly magnetic materials.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email: pankaj.k.jain@live.com

WET HIGH INTENSITY MAGNETIC SEPARATOR

It carries out high intensity magnetic separation of para-magnetic minerals.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email: pankaj.k.jain@live.com

DRY HIGH INTENSITY MAGNETIC SEPARATOR

This separator (also called Perm Roll Magnetic Separator) is used to carry out continuous high intensity magnetic separation for magnetic materials.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email: pankaj.k.jain@live.com

BIO MINERAL PROCESSING FACILITY

This facility is used to perform laboratory scale studies on processing of ores with the help on microorganisms.

Contact:
Prof. N. R. Mandre
Phone: 0326 2235456
Cell: 09431126113
Email: n_r_mandre@yahoo.com

CHEMICAL LEACHING FACILITY

Description: This facility is used to study and carryout extraction of metals from ores using chemical leaching.

Contact:
Prof. N. R. Mandre
Phone: 0326 2235456
Cell: 09431126113
Email: n_r_mandre@yahoo.com

LABORATORY WATER-ONLY CYCLONE WITH TEST RIG (CUSTOM MADE)

It is used for pilot-plant scale testing with water-only cyclones. New designs of water-only cyclones can also be tested.

Contact:
Prof. N. Suresh
Phone: 0326 2235442
Cell: 09431126465
Email: snikkam2002@yahoo.com

INDUCED ROLL MAGNETIC SEPARATOR

This separator is used to carry out continuous magnetic separation for magnetic materials and uses the principle of induction of magnetism in a roll, where the separation takes place.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email: pankaj.k.jain@live.com

SPIRAL CONCENTRATOR (LAB MODEL)	
	It is a demonstration unit and replicates the operation of industrial spiral concentrators.
	Contact: Mr. AnandAnupam Phone: 0326 2235922 Cell: 09162343434 Email: anand.anupam@live.in

PRESSURE FILTER	
	It carries out filtration of a slurry and utilizes pneumatic pressure to create a pressure gradient over a filter medium, in a batch operation.
	Contact: Mr.Shravan Kumar Phone: 0326 2235948 Cell: 09771421510 Email: shravankumar.ism@gmail.com

LABORATORY VACCUM FILTER

It carries out filtration of a slurry and utilizes suction of filtrate to create a pressure gradient through the filter cake, in a batch operation.

Contact:
Mr. Shravan Kumar
Phone: 0326 2235948
Cell: 09771421510
Email: shravankumar.ism@gmail.com

RADIAL THICKENER

Thickeners are used to carry out thickening of a slurry for recovery of water. Our radial thickener is pilot-plant scale version of the industrial Radial Thickeners.

Contact:
Mr. Shravan Kumar
Phone: 0326 2235948
Cell: 09771421510
Email: shravankumar.ism@gmail.com

DISC PELLETISER

It is a device comprising of an inclined rotating disc to carry out agglomeration of fines by their continuous rolling and tumbling. Moisture and binders are essential components of the feed mixture to form pellets.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email: pankaj.k.jain@live.com

DRUM PELLETISER

It is a device comprising of a horizontal rotating drum to carry out agglomeration of fines by their continuous rolling and tumbling. Moisture and binders are essential components of the feed mixture to form pellets.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email: pankaj.k.jain@live.com

COKE MAKING FACILITY	
	This facility is used to make coke from coking coals and study the properties of coke formed from a particular coal or a blend.
	Contact: Dr. Shalini Gautam Phone: 0326 2235650 Cell: 09471191399 Email: shalini_ism@rediffmail.com

BRIQUETTING UNIT (CUSTOM MADE)	
	This used to form bricks from fine sized coal, fly ash, etc. by the application of pressure.
	Contact: Prof. S. Bhattacharya Phone: 0326 2235440 Cell: 09431120001 Email: bhattac1957@yahoo.co.in

WEIGHING FACILITY	
	Weighing facility is available to take weight measurements from 1µg to 100 kgs.
	Contact: Dr. P. Gajbhiye Phone: 0326 2235757 Cell: 09771457921 Email: prati4u@gmail.com

HOPPER, FEEDER AND CONVEYOR SYSTEM	
	This system is a pilot-plant scale replica of the actual industrial system.
	Contact: Mr. Shravan Kumar Phone: 0326 2235948 Cell: 09771421510 Email: shravankumar.ism@gmail.com

COLUMN FLOTATION

It is used for pilot-plant scale testing for column flotation. This technology produces a much cleaner froth and is used at many locations across the globe.

Contact:
Prof. N. Suresh
Phone: 0326 2235442
Cell: 09431126465
Email: snikkam2002@yahoo.com

SPIRAL CONCENTRATOR
(MINERAL TECHNOLOGIES, AUSTRALIA, LD7)

This is an industrial-scale model of spiral concentrators used for beneficiation of relatively fine material and utilizes the principles of gravitational laminar flow.

Contact:
Mr. P. K. Jain
Phone: 0326 2235094
Cell: 07766904994
Email: pankaj.k.jain@live.com

DENSE MEDIUM CYCLONE	
	It is used for industrial scale testing and is complete with all associated equipment. The dense medium cyclone is used to perform beneficiation of coal with better efficiency.
	Contact: Prof. N. Suresh Phone: 0326 2235442 Cell: 09431126465 Email: snikkam2002@yahoo.com

HYDROCYLONE (DEMONSTRATION UNIT)	
	This unit made of colourless fiber is used to demonstrate the flows inside a hydrocyclone.
	Contact: Prof. N. R. Mandre Phone: 0326 223 5456 Cell: 09431126113 Email: n_r_mandre@yahoo.com

VORSYL SEPARATOR (DEMONSTRATION UNIT)

This unit made of colourless fiber is used to demonstrate the flows inside a vorsyl separator.

Contact:
Prof. N. R. Mandre
Phone: 0326 2235456
Cell: 09431126113
Email: n_r_mandre@yahoo.com

ROD MILL AND BALL MILL (DEMONSTRATION UNIT)

Description: This unit consists of tumbling mills made of colourless fiber is used to demonstrate the motion of charge inside a rod mill and ball mill.

Contact:
Prof. N. R. Mandre
Phone: 0326 223 5456
Cell: 094311 26113
Email: n_r_mandre@yahoo.com

TESTING MACHINES

Universal testing machine

Universal testing machines

Micro Hardness Testing Machine

Universal testing machines

The most common testing machines are universal testers, which test materials in tension or compression. Their primary function is to create the stress strain curve. Testing machines are either electromechanical or hydraulic. The principal difference is the method by which the load is applied. Electromechanical machines are based on a variable-speed electric motor; a gear reduction system; and one, two, or four screws that move the crosshead up or down. This motion loads the specimen in tension or compression. Crosshead speeds can be changed by changing the speed of the motor. A microprocessor-based closed-loop servo system can be implemented to accurately control the speed of the crosshead. Hydraulic testing machines are based on either a single or dual-acting piston that moves the crosshead up or **down.**

Micro Hardness Testing Machine: With the **270VRSD HARDNESS TESTER** all operations are managed by a single drive including automatic research of test piece.

Torsion Testing Machine

Torsion testing equipment consists of: (a) A twisting head: with a chuck for gripping the specimen and for applying twisting moment to the specimen. (b) A weight head: grips the other end of the specimen and measure the twisting moment of torque. Specification:

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TORSION TESTING MACHINE

Twin Rotor MIMO System. This functionally represents the model of a helicopter, perticularly from maneuvering control and stability viewpoint. Some control experiments are done in this set-up using MATLAB.

Inverted Pendulum. Some control experiments are done in this set-up using MATLAB. The set-up consists of a cart moving along the 1 meter length track. The cart has a shaft to which two pendulums are attached and are able to rotate freely. The cart can move back and forth causing the pendulums to swing. By applying a voltage to the motor we control the force with which the cart is pulled. The value of the force depends on the value of the control voltage, which is the control signal.

Universal Governor Apparatus. Different types of experiments can be performed on 4 types of governors (Watt, Porter, Hartnell, Proell) as listed below:
•To study the effect of varying the mass of the center sleeve in Porter and Proell Governor
•To study the effect of varying the initial spring compression in Hartnell Governor
•Determination of characteristic curve of a sleeve position against speed of rotation for all governors
•Determination of characteristics curves of radius of rotation against controlling force (Actual & Theoretical) for all governors

Static & Dynamic Balancing Apparatus. The following experiments can be performed in this set-up:
•To balance the masses statically and dynamically of a single rotating mass system
•To observation of effect of unbalance in a rotating mass system

Universal Vibration Apparatus. The set-up consists of exciter unit with FHP Motor and speed controller, ordinary strip chart recorder and damper with arrangement for changing damping.

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FLUID MECHANICS INSTRUMENTS	
	Multiple experimental set up of • Verification of Bernoulli's Theorem • Apparatus for measuring losses in pipe • Calibration of a circular orifice • Calibration of Venturimeter
	Contact: Dr. Subrata Ghosh Phone: 0326 2235601 Cell: 09430187029 Email: subratarec@yahoo.co.in & Dr.Shibayan Sarkar Phone:03262235886 Cell: 09471191818 Email:shibayan.sarkar@gmail.com
SINE WAVE VIBRO VISCOMETER	
	Range: 0.3 mPa.s – 10 Pa.s, Operating Temperature: 10-40°C, Accuracy: 1% of Repeatability, Temperature Measurement: 0-160°C The thin sensor plates are immersed in a sample are vibrated with a uniformfrequency, the amplitude varies in response to the quantity ofthe frictional force produced by the viscidity between the sensorplates and the sample. The vibro viscometer controls the drivingelectric current to vibrate the spring plates in order to developuniform

	amplitude.The driving force required for the viscidity is directly proportionalto the viscosity × density. Therefore, when vibrating the springplates with a constant frequency to develop uniform amplitudefor samples with differing viscosities, the driving electric current(driving power) is also directly proportional to the product ofviscosity and density of
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COMPUTERIZED 4-S, 4-CYLINDER PETROL ENGINE

This is highly sophisticated experimental setup fitted with Hydraulic Dynamometer, MPFI System, Fuel Level, Pressure and Temperature Sensor, Differential Pressure Transmitter, Data Acquisition Card and National Instrument (NI) Lab View. All the data transmitted by all the measuring sensors is sent to Computer in real time through Data Acquisition (DAQ) Card.

Following test facilities are available by this setup.

1. Performance Test 2. Heat Balance Sheet 3. P- θ Diagram 4. P-V Diagram 5. Morse Test

Computerized Single Cylinder, 4-S Dual Fuel (Diesel and Petrol) Variable Compression Ratio(VCR) Engine:

This computerized engine setup consists of single cylinder, four stroke, multi-fuel connected to Eddy Current Dynamometer. The operation mode of the engine can be changed from Diesel to Petrol or Petrol to Diesel by varying the compression ratio without stopping the engine and without altering the combustion chamber geometry.

Lab View based Engine Performance analysis Software package is provided with this setup for on line performance evaluation. The specifications of different modes are given below.

Diesel Mode: Power: 3.5 k W @ 1500 RPM, CR range: 12:1 – 18:1, Petrol Mode: 4.5 k W @ 1800 RPM, CR range: 6:1 – 10:1).

Jet Plate and Longitudinal Fins Solar Air Heater:
This non –conventional solar air heater fabricated for R&D purpose having two air channels formed between jet plate and absorber plate with downward longitudinal fins and jet plate and bottom plate. In this solar air heater, the flow impinges out of the holes in the jet plate and hits the bottom of the absorber plate before mixing with the flow in the channel. The impinging air jet increases the value of the convection heat transfer coefficient. This results in significant useful heat gain and collector efficiency.

Plate Type Heat Exchanger:
The plate heat exchanger normally consists of corrugated plates assembled into a frame. The hot fluid flows in one direction in alternating chambers while the cold fluid flows in true counter-current flow in the other alternating chambers. Traditionally, plate and frame exchangers have been used almost exclusively for liquid to liquid heat transfer. Plate Heat Exchangers are best known for having overall heat transfer coefficients in excess of 3-5 times the U- value in a shell and tube designed for the same service.

Concentric Tube Heat Exchanger (Plane and Finned: Comparator type):
This is a recuperative type counter flow water –air type heat exchanger in which a plane and finned tubes are fitted for comparing the performance of the heat exchanger. The objectives of this setup are to determine Log Mean Temperature Difference (LMTD), Overall Heat Transfer Coefficient(U) and Effectiveness(E). Generally finned tube heat exchangers are used in the industries for heat transfer enhancement.

Cross –Flow Heat Exchanger:
In this heat exchanger, the directions of two fluids are perpendicular to each other. Engine Radiators and condenser are the best examples of this heat exchanger. In the present heat exchanger setup, both working fluids are used as air.

Drop wise and Film wise Condensation Apparatus:
In drop wise condensation, the droplets of condensate collected over the condenser surafce are fallen due to gravity and every time fresh vapour is in contact with the condenser surface. In film wise condensation, the film of the condensate wets the surface of the condenser. The present setup is used for the studies of the above two mechanism of condensation and this also helps for visualization of the formation of droplets and film over the condenser surface.

4-stroke, 4-cylinder Turbocharged, inter-cooled Diesel engine experimental set-up with hydraulic dynameter:

	The setup has stand-alone type independent panel box consisting of air box, fuel tank, manometer, fuel measuring unit, digital speed indicator and digital temperature indicator. Engine jacket cooling water inlet, outlet and calorimeter temperature is displayed on temperature indicator. Rotameters are provided for cooling water and calorimeter flow measurement. The setup enables study of engine for brake power, BMEP, brake thermal efficiency, volumetric efficiency, specific fuel consumption, air fuel ratio and heat balance.
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REFRIGERATION & AIR-CONDITIONING EQUIPMENT

The various components those are used in refrigeration and air-conditioning applications are mounted on display board. Some of the components which are on display are: Cut section models various types of compressors, condensers, expansion devices, condenser fan blades, air-conditioning blower blades, domestic refrigerator, window-type air-conditioner etc.

Vapour compression refrigeneration cycle test rig has been designed for demonstrating refrigeration cycle, calculating coefficient of performance, heat balance at evaporator, at condenser, at overall system, plotting of Pressure-Enthalpy diagram and calculating compressor efficiency ay various loads.

The setup enables study of vapor compression refrigeration cycle and the components used in the cycles, determination of refrigeration effect, actual COP, Carnot COP, theoretical COP and refrigeration capacity. One can also calculate the heat balance for evaporator, for condenser and for overall system, plot pressure-enthalpy diagram and determine compressor efficiency at various loads.

The ice plant system has been designed for the study of demonstration of refrigeration cycle, calculation of coefficient of performance in ice manufacturing, calculation of heat balance at evaporator, condenser, overall system and study of ice manufacturing process. The system consists of hermetically sealed compressor, air cooled condenser, thermostatic expansion valve and an ice plant box, which is an insulated S. S tank with brine solution and ice cans,

The Pyranometer solar radiation recorder setup measures solar radiation upto 2000 W/m^2 with user programmable Logging Interval from 1 min to 24 hour. It uses Rechargeable SMF batteries with integral solar panel, which keeps the batteries charged throughout the year with user-friendly application software. Data retrieval is by pocket size data shuttle in computer.

Clean Energy Trainer – Experiment Set for Energy Generation, Storage and Supply

The experimental setup introduces the students to renewable energies like solar energy and wind energy and their combination with hydrogen fuel cell technology, illustrating the complete energy chain. The setup allows use of Solar, wind and hydrogen components separately with PC-supported measurement and experimentation, while USB data monitor serves as electronic load and power supply.

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MECHANICAL VIBRATION EQUIPMENT

A test rig resembling mine ventilation fan for studying various type of mechanical faults and vibration behavior.

Machine fault simulator is a working model designed to perform research and study of all the mechanical faults and unwanted vibration raised from the faults.

The Function Generator and Shaker are used for developing excitation force with known magnitude and frequency.

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WORKSHOP EQUIPMENT

Hydraulic mounting press is used for the purpose of mounting of sample in order to view microstructure and surface finish as well as for edge retention and semi automatic polishing machine is used for the purpose of polishing to get mirror finish surface in order to get clear view of the micro structure of the specimen.

CNC Machining lab consists of computer numerical control (CNC) trainer turning machine with fanuc control system and CNC trainer milling machine control along with fanuc programming with latest software for manufacture of fine tolerance components.

This EDM/ECM facility consists of Wire Cut Electrical Discharge Machine (EDM) Plant With CNC Control System for Machining of very hard and complex shaped and Electro Chemical Machining (ECM) Equipment for machining parts components having Fine tolerance.

The Metrology facilities has Auto- Collimator, Metallurgical Microscope, Mechanical/Digital VernierCalipers, Mechanical/Digital Micrometer, Standard Wire Gauge Slip Gauge, Mechanical Vernier Height Gauge, Mechanical Gear Tool VernierCalipers, Flange/ Disc Micrometer, Sine Bar, Dial Gauge apart from other measuring instruments for dimensional.

<table>
<tr><td>  </td><td rowspan="2">Metallurgical Microscope is used for study metalographic specimens.

Flexible Manufacturing System (FMS) is a Fully Automatic Storage and Retrieval System (ASRS), X-Y axis robot alongwith CNC Turning machine (Flexiturn). The Flexiturn uses Samsung Controller. A two axis loader is used to load and unload the job from the Flexiturn. It is a semi-production machine.</td></tr>
<tr><td>  </td></tr>
<tr><td></td><td>Contact
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Cell: 09431711359
Email : nks_221@yahoo.co.in</td></tr>
</table>

HYDROSTATIC DRIVE SYSTEM

Valve control by hydrostatic drive system where the performance of the system can be studied by varying the supply flow controlled through proportional control valve. Drive system having 7.5KW power

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HYDROSTATIC TRANSMISSION SYSTEM

Hydrostatic transmission system using two motor summation drives. The closed loop hydrostatic system using variable displacement axial piston pump and bent axis motor can be studied using single as well as two motor systems. Power pack rating of the system is 10KW. Configuration of the system can be changed from single motor to two motor drive system while in operation.

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OPEN AND CLOSED LOOP HYDROSTATIC TRANSMISSION SYSTEM

Performance testing of open and closed loop hydrostatic transmission system of power rating 12 KW. Closed loop system consists of variable displacement piston (swash plate) pump and have low speed high torque radial piston motor. Open loop system consists of pressure compensated axial piston pump and low speed high torque motor.

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HYDRAULIC TRANSMISSION SYSTEM

Hydraulic transmission system using accumulators. The energy efficiency of hydraulic transmission system can be studied using different capacity (10 litres and 20 litres) accumulators.

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CONDITION MONITORING SYSTEM	
	Condition Monitoring of all types of shearer motor. Overloading, single phasing, broken rotor bars, intern turn short circuit
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ROCK MECHANICS & GROUND CONTROL	
	○ Material Testing System (MTS) (100 tonnes), an electro-hydraulic stiff testing machine, is used for testing the various physico-mechanical properties of rocks under different conditions of loading. ○ Compression Testing Machine (600 tonnes), is used for determining various strength parameters of rocks and other materials. ○ Transducers and Sensors, consist of precision Load Cells, Pressure Transmitters, Pressure Transducers, Strain Gauges and LVDTs. These are invariably used with on-line PC based Data Acquisition System for recording test parameters. ○ PC Based Data Acquisition System, a state of the art 8-Channel Data Acquisition System with sampling rate of 9999 samples per second for on-line acquisition of test data like strain, displacement, pressure, load, temperature etc. This is used invariably in all the laboratory experiments. ○ MINIFRAC is used for determining the in-situ

stresses in rock mass by hydro-fracturing technique.

- Hydraulic Leg testing facility, for testing Powered Roof Support used in longwall mining. This is a DGMS approved facility.
- Mine Support testing facilities, for all types of mines support including rock bolt anchorage tests (DGMS approved)
- Rock Mechanics computation laboratory, for modeling & simulation studies related to strata control in mines.

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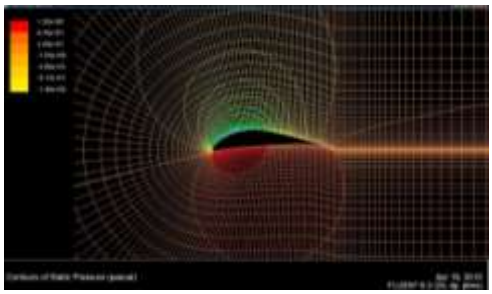
MINE VENTILATION AND SUB-SURFACE ENVIRONMENTAL ENGINEERING



- Artificial lung machine and related set-up for simulation of rescue operations in mines, the first of its kind in an educational institution.
- Microprocessor based Gas Chromatograph System, for detection and measurement of different gases in the mine air.
- Calibration setup for ventilation and safety equipment, viz, methanometer, toximeter, multigas detector, anemometer, dust samplers etc.
- Quick thermal conductivity meter, to measure the thermal conductivity of rocks.
- Facilities for studying CPT and IPT, Sz-index and U-index for finding the susceptibility of coal to spontaneous heating.
- Precise instruments, for carrying out pressure – quantity surveys in mines.
- Experimental set-up, for studying methane emission from coal seams.
- Real time aerosol monitor, gravimetric dust sampler, personal dust sampler, konimeter with projector, for studying the air borne respirable dust concentration in mine air.
- Experimental set-up, to study coal-dust explosion hazard.
- Mine ventilation computation laboratory, for computation of ventilation problems, is a part of the Mine Ventilation and Environment Laboratory.
- Digital sound level meter with recorder, for studying noise levels in mines and mining areas.
- Experimental facilities for studying the physico-chemical properties of cement and resin capsules used for support systems.

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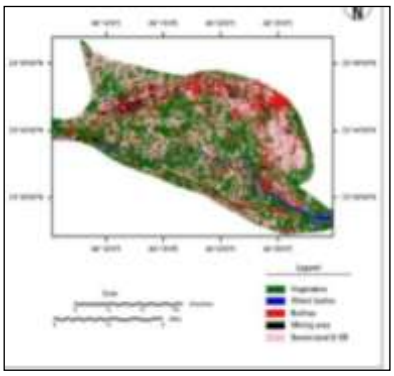
MINE SURVEYING, GIS & REMOTE SENSING

- Differential GPS Equipment Leica GS12 GNSS Smart Antenna [Geodetic 120 channel dual frequency GNSS receiver, includes capability of GPS L1 + L2, Glonass, Galileo, GPS L5, Network RTK, Raw data logging), Field Controller with all the accessories and necessary software for downloading & processing the data

- The most accurate precision-surveying North Seeking Gyroscope Integrated with Electronic Total Station, Gyromat – 3000, DMT GmbH & Co. KG (DMT), Germany [First of its kind in an educational institute].
- Digital & Precise level, for carrying out precise subsidence survey & monitoring.
- Laser eyepiece, for correlation and alignment survey with high accuracy.
- Geomatic laboratory for processing satellite imageriesand generation of layer based thematicmaps.
- Mine surveying computation laboratory with surveying software for earthwork calculations, 3D representations, sectioning etc.
- Digitizer, Large Format Scanner and plotter for preparation of digital maps and plans, digitization of old plans and converting.



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DRILLING, BLASTING AND MECHANICAL CUTTING OF ROCKS

- High speed video camera, for study of mechanics of rock fragmentation, and movement of rock mass and projectiles.
- Rock excavation computer simulation laboratory for blast simulations, rock fragmentation and distribution analysis using the digital images acquired by a video camera etc.
- Vibration recorders and sophisticated chip based micro seismographs, to record blast vibration levels and analyze peak particle velocity, dominant frequency, FFT analysis and safe vibration levels.
- VOD probe, for measuring velocity of detonation of explosives inside a blast hole.
- Digital storage oscilloscope along with borehole pressure transducer, for recording detonation pressure inside blast holes.
- Cerchar hardness apparatus, for estimation of drilling parameters and machine specifications from small rock samples.
- Sequential blasting machine, for providing very precise and wide range of delays in blasting circuits.
- Near-field vibration measuring set-up, for understanding the rock–explosive interaction for blast damage assessment.
- Fracture toughness of rocks
- Micro-hardness of rocks
- Drilling Rate Index for TBM selection
- CercharAbrasivity Index
- Seismic velocity of rocks(rock/rockmass)
- Petrological studies and image analysis
- Underwater Blast vibration monitors

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LONGWALL MINE GALLERY	
	An unique 30 Meter longwall mock gallery with Powered Support, Shearer, AFC, Stage Loader, Power Pack etc, a facility which is not available in any other institute in India
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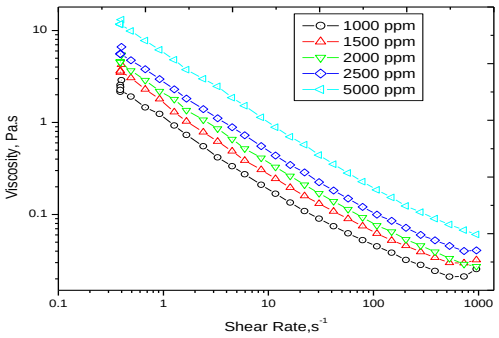
RHEOMETER



MCR rheometers are based on a concept at the cutting edge of technology. Any type of rheological tests in rotational mode is possible with the MCR rheometers**.** The modularity of the system allows the integration of a wide range of temperature devices and application-specific accessories.

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FTIR

The powerful and adaptable range of Frontier™ IR systems is assured to meet the needs of your current IR analysis and can also be expanded as your research or analytical goals evolve. Offering flexible system configurations in the near, near-mid, mid-far and far infrared regions, Frontier can support an extensive range of applications thanks to its superb sensitivity and configurability.

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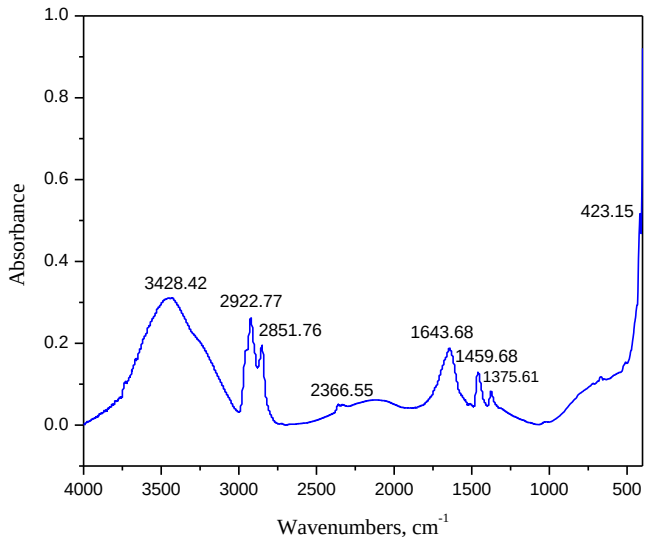
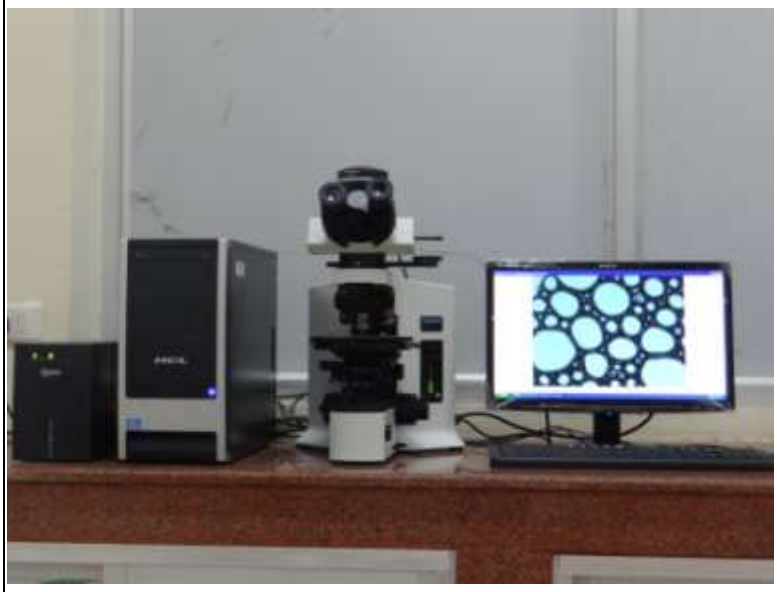

1.0
0.8
0.6
0.4
0.2
0.0
Absorbance
3428.42
2922.77
2851.76
2366.55
1643.68
1459.68
1375.61
423.15
4000
3500
3000
2500
2000
1500
1000
500
Wavenumbers, cm-1

MICROSCOPE



The BX51P polarizing microscope is an investigative tool for the identification of isotropic and anisotropic materials, forensic analysis, thin film/polymer/crystal identification, and extraneous particulates.

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GAS CHROMATOGRAPH

Typical uses of GC include testing the purity of a particular substance, or separating the different components of a mixture (the relative amounts of such components can also be determined). In some situations, GC may help in identifying a compound.

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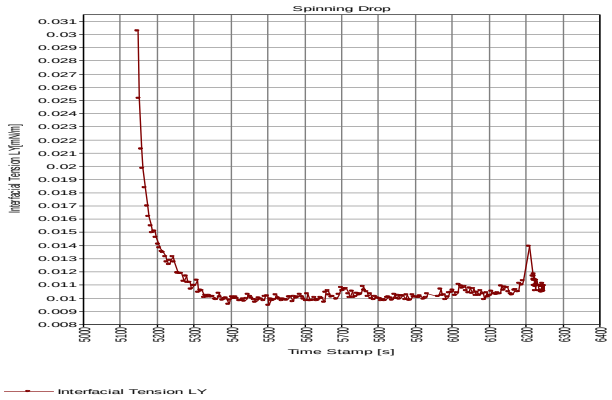
SPINNING DROP TENSIOMETER



The spinning drop video tensiometer SVT 15N is a special-purpose optical instrument for measuring of conventional to extremely low interfacial tensions. A high-precise optics, a fast image processing system, and an electronically commuted direct-drive combined with the very compact instrument design allows fast and precise results.

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HELIUM POROSIMETER

The PORG-200 provides a modern state-of-the-art measuring instrument that allows the student to go through the measurement process in a structured transparent method. This instruction-focused design allows to build on his basic knowledge of porosity.

The instrument is based on Boyle's law and allows the student to make grain volume measurements on core plugs. This information combined with bulk volume data allows for the calculation of sample porosity.

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TPH/TOG ANALYZER	
	These measurements help ensure compliance with governmental regulatory discharge permits-whether you are involved in the oil and gas, chemical, biofuels or virtually any other industry faced with monitoring their wastewater. Measurement limit: 50-200 ppm
	Contact: Dr. Ajay Mandal Phone: 0326 2235485 Cell: 09431711017 Email: mandal_ajay@hotmail.com

TENSIOMETER	
	The EassyDyne instrument is a tensiometer for measuring surface surface and interfacial tension of liquids using the Wilhelmy Plate or Du Nouy Ring method. In addition, it is able to determine the density of liquids.
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