CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020 ONLINE

Lecture Series-1

Lecture/Demonstration describing Experiments and Equipments (Online Practical) Under CSIR SRTP 2020

Maximum no. of students per batch: 40, ideal number is 30

Duration of the demonstration: 30-40 mins; followed by 20-30 mins Q&A session. Students are encouraged to ask questions.

Each student may register for a minimum of 8 and a maximum of 15 classes from Lecture Series 1 & 2. Each Student will be allowed to participate in one course from each lecture series

Home assignment will be given at the end of each lecture for analysis of the various data and parameter obtained from experiments performed using the equipments. This is a plan forwarded for the applicants selected at CSIR-NEIST. Every laboratory/institute will come up with their own plan of lectures.

Every candidate is expected to maintain a laboratory notebook and record all the points. This notebook will be helpful for them to prepare the final report. The same notebook can be used for the project activity.

S. No.	Lecture topic and Live demonstration	Course Code	# classes
1	Introduction to 400 and 500 MHz NMR Spectrometers and their working principle	SRTP-I001	8
2	Importance of GC-MS in characterization of volatile compounds	SRTP-I002	8
3	Working principle of a Fluorescence Spectrometer and its application in colour chemistry	SRTP-I003	8
4	FTIR Spectrometer and its application in characterization and identification of important chemical entities	SRTP-I004	8
5	Estimating purity of a compound via UHPLC and its role in medicinal chemistry	SRTP-I005	12
6	Elemental analysis by CHN-Analyser	SRTP-I006	6
7	Surface characterisation by using X-ray Photoelectron Spectroscopy (XPS)	SRTP-I007	6
8	Field Emission Scanning Electron Microscope (FESEM) for morphological characterisation of compounds	SRTP-I008	6
9	Importance Transmission Electron Microscope (TEM) in surface imaging and texture determination	SRTP-I009	8

	of compounds		
10	Molecular weight determination of polymers through Gel Permeation Chromatography (GPC)	SRTP-I010	6
11	Thermal profiling of polymers and organic materials by Thermal Gravimetric Analysis (TGA)	SRTP-I011	6
12	Glass transition temperature determination with Differential scanning calorimetry (DSC)	SRTP-I012	4
13	Viscosity determination with high performance viscometer	SRTP-I013	4
14	Flash Point determination of volatile compounds and its role in petro chemical industry	SRTP-I014	4
15	Tensile strength measurement of fibres via Universal Testing Machine	SRTP-I015	5
16	Hands on demonstration Hydraulic Hot Press and its utility	SRTP-I016	4
17	Calorific value determination of bio-mass and coal with Bomb Calorimeter	SRTP-I017	6
18	Sulphur content determination of organic compounds through Sulphur Analyser	SRTP-I018	6
19	Proximate Analyser for coal ash and volatile matter content determination	SRTP-I019	6
20	Determination of reduction potential by Cyclic Voltammetry	SRTP-I020	6
21	Preparation of Flat Sheet Membranes	SRTP-I021	6
22	Preparation of Hollow Fiber Membranes	SRTP-I022	6
23	Determination of Hydrophobicity and Hydrophilicity by measuring Contact Angle	SRTP-I023	6
24	Determination of Surface area and porosity of Nanoparticles by BET Chemisorption and Physisorption Analyser	SRTP-I024	6
25	Determination of Surface charge of a polymer surface by Electrokinetic Analyser	SRTP-I025	5
26	Chiral analysis by UHPLC	SRTP-I026	5
27	Hands on demonstration of Cement and Aggregate Testing	SRTP-I027	5
28	Concrete Testing and its importance in construction Industry	SRTP-I028	5
29	Basic principle and live demonstration of Soil Testing	SRTP-I029	4
30	Universal Testing Machine for tensile strength of metal bars	SRTP-I030	4
31	Live demonstration of Digital Impact Tester	SRTP-I031	4
32	Use of 3D Printer and its impact on medical science	SRTP-I032	6
33	Laser Engraving for industrial logo printing on metal surface	SRTP-I033	5
34	Application of Thermal Imaging to measure temperature of very hot surface	SRTP-I034	5
35	Making of highly precise tools and threads by CNC Lathe machine	SRTP-I035	4
36	Use of CNC Milling for precise drilling and cutting	SRTP-I036	4

	of metallic surfaces		
37	A practical web demonstration of Wire Electro-discharge Machining and its utility	SRTP-I037	5
38	Preparative High Performance Liquid Chromatography (Prep-HPLC), its working principle and role in separation of bio and drug molecules	SRTP-I038	5
39	Identification of organic compounds using High Resolution Mass Spectroscopy (HRMS)	SRTP-I039	5
40	Utility of Rotary Evaporator in chemical laboratories for efficient and gentle removal of solvents	SRTP-I040	3
41	Freeze drying of biological and natural products by Lyophilizer	SRTP-I041	3
42	Reconstruction of three dimensional image of bio-materials via Confocal Microscopy	SRTP-I042	5
43	Role of Seismometer in assessing seismicity	SRTP-I043	5
44	Use of Ground Penetrating Radar in soil characterisation	SRTP-I044	5
45	Proton Precession Magnetometer and its use in Earth Sciences	SRTP-I045	5
46	Multi Channel Surface wave Analysis for earth strata characterisation	SRTP-I046	5
47	Peak ground acceleration measurement via Accleograph for construction industry	SRTP-I047	5
48	Usage of Global Positioning system (GPS) for assessing crustal deformation patterns	SRTP-I048	5
49	Determination of Zeta Potential of compounds and its importance	SRTP-I049	4
50	Fundamentals and applications of UV/VIS Spectroscopy	SRTP-I050	5
51	Solid phase peptide synthesis (SPPS) to construct oligopeptides via microwave assisted Peptide Synthesizer	SRTP-I051	5
52	Determination of ions present in water sample via Ion Chromatography	SRTP-I052	4
53	Working principle and training on Optical Microscope	SRTP-I053	4
54	Role of Resistivity meter in ground profiling	SRTP-I054	5
55	Moisture content determination of wood sample through wood moisture meter	SRTP-I055	4
56	Gloss and colour determination of paper	SRTP-I056	4

Lecture Series-2

SRTP-2020 Lectures on Specialized Topics

This series of lecture will cover various advanced topics of science and will be delivered by eminent scientists. Duration of these sessions will be 30 min followed by 30 min of interactive/question answer session.

Sl. No.	Topics	Course Code	# classes
1.	Fundamental of Thermodynamics	SRTP-G001	5
2.	Chemical Bonding	SRTP-G002	10
3.	Artificial Intelligence for Mankind	SRTP-G003	10
4.	Machine learning: Why and How	SRTP-G004	10
5.	Importance of Big data analysis	SRTP-G005	10
6.	Non covalent interaction	SRTP-G006	10
7.	Progress of science at World War II	SRTP-G007	10
8.	Usefulness of useless science	SRTP-G008	10
9.	CV Raman: Role model of Indian Science	SRTP-G009	5
10.	Dye degradation by Nano particle	SRTP-G010	5
11.	Colorimetric detection of analyte	SRTP-G011	5
12.	Nanoenzyme: A modern perspective	SRTP-G012	5
13.	Photothermal Therapy	SRTP-G013	5
14.	Structural Catalyst	SRTP-G014	5
15.	Intellectual Property and Patent Filing	SRTP-G015	5
16.	Photocatalytic degradation of water pollutant	SRTP-G016	5
17.	Carcinogenic benzene to useful chemical	SRTP-G017	5
18.	Nanomaterials for catalytic application	SRTP-G018	5
19.	MOF for catalytic application	SRTP-G019	5
20.	Click reaction by PPM level catalyst loading	SRTP-G020	4
21.	Aromatization/dearomatization: Frontier approach in Catalysis	SRTP-G021	4
22.	Wonder of two metals in catalysis	SRTP-G022	5
23.	Fundamental and application of fluorescence spectroscopy	SRTP-G023	5
24.	Green Chemistry	SRTP-G024	6
25.	Free-Radical in organic synthesis	SRTP-G025	6
26.	Isolation and characterization of natural products	SRTP-G026	5
27.	Natural Products in Drugs	SRTP-G027	6
28.	Photochemistry	SRTP-G028	5

29.	Flow Chemistry	SRTP-G029	5
30.	Click Chemistry	SRTP-G030	5
31.	C-H activation	SRTP-G031	10
32.	Reaction Intermediates	SRTP-G032	5
33.	Solid acid catalysis	SRTP-G033	5
34.	Peptide Synthesis	SRTP-G034	5
35.	Nanobot in Drug Delivery	SRTP-G035	5
36.	Name reactions in organic synthesis	SRTP-G036	5
37.	Aryne Chemistry	SRTP-G037	5
38.	Advanced coordination chemistry	SRTP-G038	5
39.	Carbohydrate chemistry	SRTP-G039	6
40.	Drug repurposing for COVID-19	SRTP-G040	6
41.	Steroid Chemistry	SRTP-G041	5
42.	Monitoring and assessment of air pollution in urban area	SRTP-G042	5
43.	Physico-chemical characteristics of atmospheric carbonaceous aerosols and its meteorological impacts	SRTP-G043	5
44.	Conversion of coal in to high value-added products	SRTP-G044	5
45.	Waste biomass to sustainable energy: A bio-refinery approach	SRTP-G045	5
46.	Trash to treasure: turning waste into carbon nanomaterials	SRTP-G046	5
47.	Structural and properties of highly toughened bio-degradable poly lactic acid (PLA)/CuO nano-composite film.	SRTP-G047	5
48.	Development of starch/cellulose based biodegradable composite.	SRTP-G048	5
49.	Extraction of asphaltenes, resin and wax from crude oil.	SRTP-G049	5
50.	Production of bio-diesel from waste edible oil and its characterization.	SRTP-G050	5
51.	Physico-chemical characterization of high speed diesel (HSD).	SRTP-G051	5
52.	Aromatic crops: end products, market and legislation	SRTP-G052	5
53.	Methods of plant breeding	SRTP-G053	5
54.	Botanicals for insect pest management	SRTP-G054	5
55.	CSIR-AROMA MISSION: a CSIR-NEIST initiative	SRTP-G055	6
56.	Scope of species diversity and discovery in North East India	SRTP-G056	5
57.	Gas Chromatography and its application	SRTP-G057	5

58.	Cultivation practices of medicinal and aromatic crops	SRTP-G058	5
59.	Entrepreneurship development through medicinal and aromatic crops	SRTP-G059	5
60.	Collection, documentation, deposition and digitization of plant specimens	SRTP-G060	5
61.	Non-food oil seeds as an alternative source for biofuel	SRTP-G061	5
62.	Assessing the plant diversity using taxonomic tools	SRTP-G062	5
63.	Essential oils as antivirals	SRTP-G063	5
64.	Prospects of Ethnobotany in North East India	SRTP-G064	5
65.	Study on macroscopic and microscopic morphological characters of plants	SRTP-G065	5
66.	Impact of elevated carbon dioxide on insects	SRTP-G066	5
67.	*Kaempferia galanga*: a wonderful crop	SRTP-G067	5
68.	Safrole: a molecule with evolved identity	SRTP-G068	5
69.	Design and development of polymeric membranes and different characterization techniques	SRTP-G069	5
70.	Membrane technology for emerging applications	SRTP-G070	5
71.	Membrane separation processes for biomolecules	SRTP-G071	5
72.	Membrane separation processes for chiral separations	SRTP-G072	5
73.	Polyphenols: Importance and separation	SRTP-G073	5
74.	Natural dyes and their industrial applications	SRTP-G074	5
75.	Membrane technology for gas separation in air pollution control: The growing paradigm shift	SRTP-G075	5
76.	Membrane separation and waste water treatment from industries	SRTP-G076	5
77.	Membrane Technology in Petroleum Industries	SRTP-G077	5
78.	Teaching and research in chemistry and engineering: The Indian perspective	SRTP-G078	5
79.	Extraction of value added products from waste plant material	SRTP-G079	5
80.	Treatment of wastewater generated from petrochemical industries	SRTP-G080	5
81.	Ceramic membrane development and its characterization techniques	SRTP-G081	5
82.	Polymer Membranes for Sustainable Future	SRTP-G082	5
83.	Role of nanotechnology in membrane science and technology	SRTP-G083	5

84.	Development of novel thin film composite and thin film nanocomposite membranes for gas separation	SRTP-G084	5
85.	MOF@clay composites:Promising materials for separation applications	SRTP-G085	5
86.	Development of novel thin film nanocomposite membranes for separation for pharmaceutical compounds	SRTP-G086	5
87.	An Overview of Petroleum Exploration and Production	SRTP-G087	5
88.	Importance of subsoil investigation for civil engineering construction work	SRTP-G088	5

****