Course Title	**Analysis by Fourier Transform Infrared Spectrophotometer**
Purpose	Able to handle the instrument independently & can analyses the spectra
Eligibility	B.Sc./M.Sc. with Chemistry or Industrial Chemistry as main subject Or B.Sc. / M.Sc. with Biotech or B. Pharm. /M. Pharm.
Duration	One Week
Location	ATI campus, ATI Main bldg. AVTS chemical, Industrial Chemistry Section
Learning Outcomes	1) Have a knowledge of sampling techniques for different samples 2) Carry out calibration by polystyrene film. 3) Prepare samples for analysis of solids by using DSR8000 assembly 4) Prepare liquid samples by using different cells 5) Analysis of spectra obtained in each above case 6) Identify functional group and bonding for different samples 7) Find out the purity of the sample 8) Match the sample spectrum or individual peak with library data
Teaching Methods	1) Lectures in class room 2) Practice sessions & practical's 3) Demonstrations 4) Role plays
Assessment Methods	Formative assessment consist of following things

Sr. no.	**Criteria for assessment consist of following things:**	**Maximum marks**
1- A	Attendance & punctuality	20
2- B	Sincerity	10
3- C	Ability to grasp the topic	10
v	**Summative assessment through objective type questions consists of following things:**	
Sr. no	**Criteria for assessment**	**Maximum marks**
1	Test consists of practical knowledge	30
2	Test consists of theoretical knowledge	20

Course Schedule

Day1

1st session: Introduction to infrared Spectrophotometric, explanation on difference between FTIR & Dispersive IR

2nd Session: Construction &working of FTIR &Dispersive IR, Advantages of FTIR over dispersive IR

Day2

1st Session: FTIR analysis by different modes like transition mode reflection mode, Analysis of different sample types like solid liquids, paper, cloth, hair etc.

2nd Session: Analysis of spectrum on the basis of wave number individual peak indicating functional group or bond type

Day3

1st Session: Explanation of SOP &Demonstration of working of instrument on the basis of SOP, calibration of instrument analysis of paper sample in transmition mode

	2nd Session: Practice of study of SOP for individual person and analysis of different samples in transmition mode **Day4** 1st Session: Demonstration of analysis of solid sample using DRS assembly &analysis of spectrum obtained 2nd Session: Same is practiced by each individual for different solid samples **Day5** 1st Session: Demonstration of analysis of liquid samples by using fixed thickness cell & demountable cell practice of the same for different liquid samples 2nd session Assessment of the exercises
AIDS	White board ,LCD projector, Instrument FTIR, silica gel, DRS assembly, Fixed thickness cell, Demountable cell, Morter & pestle, IR grade chemicals like potssium bromide, Sodium chloride window
Instruction Material	TD/AVTS/AV05/06/CM

Course Title	**Analysis by Gas Chromatography**
Purpose	Able to handle the instrument ,Analyses the samples qualitatively & quantitatively
Eligibility	B.Sc./M.Sc. with Chemistry or Industrial Chemistry as main subject Or B.Sc. / M.Sc. with Biotech Or B. Pharm. / M. Pharm.
Duration	10 days
Location	ATI campus ,ATI Main bldg. AVTS chemical, Industrial Chemistry Section
Learning Outcomes	1. Get a clear idea of what is gas chromatography ,different stationary phases which are to be used as per sample to be analyses 2. Knowledge about working &characteristics of column 3. Able to handle the gas cylinders for starting & closing of instrument 4. Able to measure the flow of carrier gas ,& change or fit a new column 5. Can separate a mixture of 2/3/4/many components & find out the %of each component in the mixture 6. Can separate the mixture by giving temperature programming
Teaching Methods	1. Lectures in class room 2. Practice sessions or practical's 3 .Group exercises or projects 4. Demonstrations 5. Role plays
Assessment Methods	Formative assessment consist of following things:-

Sr. no.	**Criteria for assessment consist of following things:**	**Maximum marks**
1- A	Attendance & punctuality	20
2- B	Sincerity	10
3- C	Ability to grasp the topic	10
V	**Summative assessment through objective type questions consists of following things:**	
Sr. no	**Criteria for assessment**	**Maximum marks**
1	Test consists of practical knowledge	30
2	Test consists of theoretical knowledge	20

Course Schedule	**Day1** 1st Session: Introduction to gas chromatography, familiarize with the parts of the instrument &their working 2nd Session: to be continued **Day2** 1st Session: Explanation &demonstration of each part of GC and it's working setting of parameters on the basis of SOP 2nd Session: Actual practice of injection &handling of instrument **Day 3** 1st Session: Practice of separation of mixture of two components on column A at constant temp by changing injection volume 2nd session: Same is repeated on column B, discussion on changes observed **Day4** 1st Session: Choose appropriate column, temperature parameters so that proper separation of the two components in the sample will obtained(performed in group) 2nd Session: A mixture two components mixed in a known proportion by weight is analyses & weight % of each component is determined at different parameters

	Day5 1st Session: A mixture of three components is analyses at different parameters is analyses in column A & B 2nd Session: A mixture of three components having close boiling points are separated by selecting the parameters Explanation of certain advance techniques of GC analysis like head space, purge &trap **Day6** 1st Session: Separation of mixture to determine the composition quantitatively by internal standard method explanation of the method, solution preparation &calculation 2nd Session: Performance of same practical at different parameters &calculate the composition of unknown **Day 7** 1st Session: Explanation of temperature programming concept procedure for doing PTGC (different ways) demonstration of PTGC 2nd session Practicing PTGC by taking simple mixture of two constituents **Day8** 1st Session: Practicing PTGC by taking mixture of three constituents, which are not separating in isothermal mode properly 2nd Session: Practicing PTGC by taking mixture of three constituent **Day 9** 1st Session: Introduction of another instrument GC (ashco) Explanation of working procedure & Demo on the same 2nd Session: Practicing of analyzing mixtures of 2/3 constituents on the above instrument in isothermal mode **Day10** 1st Session: Explanation of PTGC function on the GC (ascho) Practicing of analyzing mixtures of 2/3 constituents in PTGC mode 2nd Session: Assessment & valediction
AIDS	LCD projector, white board, instruments- Gas Chromatograph--1NETAL -make, 2ASCHO-make, gas cylinders of hydrogen, nitrogen & zero air. injection syringe, sample vials etc.
Instruction Material	TD/AVTS/AV05/02/CM

Course Title	**Analysis by High Performance Liquid Chromatography (HPLC)**
Purpose	Able to handle the instrument, Analyses the samples qualitatively & quantitatively
Eligibility	B.Sc./M.Sc. with Chemistry or Industrial Chemistry as main subject Or B.Sc. / M.Sc. with Biotech Or B. Pharm. / M. Pharm.
Duration	5 Days
Location	ATI campus, ATI Main bldg. AVTS chemical ,Industrial Chemistry Section
Learning Outcomes	1. To get clear concepts about types, modes, scales of HPLC 2. Get an idea of working of the instrument. 3. Preparation of solutions of different concentrations 4. Analyses the sample & identify it (qualitative determination) 5. Analyses the sample quantitatively to find the % amount 6. Quantitative determination by different methods &calculations
Teaching Methods	1. Lectures in class room 2. Practice sessions or practical's 3. Group exercises or projects 4. Demonstrations 5. Role plays
Assessment Methods	Formative assessments consist of following things:-

Sr. no.	**Criteria for assessment consist of following things:**	**Maximum marks**
1- A	Attendance & punctuality	20
2- B	Sincerity	10
3- C	Ability to grasp the topic	10
V	**Summative assessment through objective type questions consists of following things:**	
Sr. no	**Criteria for assessment**	**Maximum marks**
1	Test consists of practical knowledge	30
2	Test consists of theoretical knowledge	20

Course Schedule

Day1

1st Session: Introduction to liquid chromatography, history &origin of chromatography, types of chromatography

2nd Session: Construction & working of the instrument, as per the SOP basis of separation, polarity scale.

Day 2

1st Session: Explanation of preparation of solution, calculation of quantitative determination, Demonstration of working of instrument & precautions to be taken while working.

2nd Session: Preparation of solution, practicing of Injecting the sample individually

Day 3

1st Session: Explanation of 1st experiment with solution preparation & calculation, study of linearity response, actual performance of individual.

2nd Session: Process continued until completion of all individuals calculation, plotting graph, discussion for conclusion

Day 4

1st Session: Explanation of 2nd experiment separation of constituent of mixture quantitatively ,solution preparation, calculation performance of each individual

2nd Session: Practical continued, calculation & result discussion.
Explanation of 3rd experiment, Determination of caffeine content of given sample. Explanation of preparation of sample, standard & calculation

	Day 5 1st Session: Performance of practical by each person, calculation by graph and formula, conclusion by result. 2nd Session: Assessment & Valediction
AIDS	LCD projector, white board, Instrument -High Performance liquid chromatography (HPLC) grade chemicals like methanol, acetonitrile, benzene, acetone, toluene etc. samples to be analyses like tea, coffee, cold drink,& standard like caffeine, benzoic acid, glass apparatus like std volumetric flask of capacity 10ml,25ml,50ml,graduated pipettes, beakers HPLC syringe, sonicator, balance.
Instruction Material	TD/AVTS/AV05/03/CM

Course Title	**Industrial Chemical Analysis**
Purpose	knowledge of different analysis carried out in different industries like chemical pharmaceutical, oil petroleum, metallurgical, soap etc.
Eligibility	B.Sc./M.Sc. with Chemistry or Industrial Chemistry as main subject Or B.Sc. / M.Sc. with Biotech or B. Pharm./M. Pharm.
Duration	20 Days
Location	ATI campus ,ATI Main bldg. AVTS chemical ,Industrial Chemistry Section,
Learning Outcomes	1) Clear concept of solution preparation, handling of chemicals. 2) Able to determine %purity of any chemical like acid, base, KMnO4, CuSO4 etc. 3) Able to determine %of any constituent from mixture or sample 4) Able to determine Sap, Acid value of oil sample 5) Able to determine viscosity, flash point of oil sample by using instrument 6) Able to determine pH, conductivity, refractive index of given sample 7) Expert in using electronic balance, oven & other laboratory equipments.
Teaching Methods	1) Lectures in class room 2) Practice sessions or practical's 3) Group exercises or projects 4) Demonstrations 5) Role plays
Assessment Methods	Formative assessment consist of following things:-

Sr. no.	**Criteria for assessment consist of following things:**	**Maximum marks**
1- A	Attendance & punctuality	20
2- B	Sincerity	10
3- C	Ability to grasp the topic	10
v	**Summative assessment through objective type questions consists of following things:**	
Sr. no	**Criteria for assessment**	**Maximum marks**
1	Test consists of practical knowledge	30
2	Test consists of theoretical knowledge	20

Course Schedule	It is divided in 4 weeks (1) Theory session covers the basic concepts, solution preparation, procedure for the experiment. (2)Actual practical ,calculations of result 1st week acidimetric - alkalimeter 2nd week oxidation-reduction 3rd week oil analysis, instrumental analysis 4th week instrumental analysis continued, assessment, valediction
AIDS	LCD projection, white board, instruments like pH meter, moisture balance conductivity meter, electrolytic analyzer, refractometer, flash point apparatus, autotitrator etc. all the glass apparatus required for volumetric analysis, all A.R grade chemicals which are used as standard &samples.
Instruction Material	TD/AVTS/AV05/05/CM

Course Title	**Spectrophotometric Methods of analysis**
Purpose	Able to analyses different samples by using different types of spectrophotometers
Eligibility	B.Sc./M.Sc. with Chemistry or Industrial Chemistry as main subject Or B.Sc. / M.Sc. with Biotech or B. Pharm./M. Pharm.
Duration	15 Days
Location	ATI campus, ATI Main bldg. AVTS chemical, Industrial Chemistry Section
Learning Outcomes	Clear idea of Spectrophotometric analysis, knowledge of preparing different standard solutions of various concentration, handling of different types of spectrophotometer according to the samples, determination of % amount or amount of particular constituent of sample.
Teaching Methods	1) Lectures in class room 2) Practice sessions or practical's 3) Group exercises or projects 4) Demonstrations 5) Role plays
Assessment Methods	Formative assessment consist of following things:-

Sr. no.	**Criteria for assessment consist of following things:**	**Maximum marks**
1- A	Attendance & punctuality	20
2- B	Sincerity	10
3- C	Ability to grasp the topic	10
v	**Summative assessment through objective type questions consists of following things:**	
Sr. no.	**Criteria for assessment**	**Maximum marks**
1	Test consists of practical knowledge	30
2	Test consists of theoretical knowledge	20

Course Schedule	It is divided in 3 weeks, 1. Theory session covers the basic concepts, solution preparation, procedure for the experiments. 2. Actual practical, Calculations of result **1st week-** photo colorimetric and visible spectrophotometer analysis of copper and iron. **2nd week-**UV- Visible Spectrophotometer analysis Nitrate, Vanadium etc. Spectroflurometer analysis of Riboflavin and Quinine **3rd week-** Flame photometer Analysis of different sample for Sodium, Potassium, and Calcium. Polarimeter- Analysis of Different Sugars. Nephelometer- Analysis of sample to find Turbidity
AIDS	LCD Projection, white board, Instruments like Photo colorimetry and visible spectrophotometer, UV–Visible spectrophotometer, Spectroflurometer, Flame photometer, Polarimeter, Nephalometer etc pipettes, beakers, volumetric flasks, etc. AR Grade Chemicals like Potassium nitrate, Riboflavin, Quinine, mineral acids, bases and reagents.
Instruction Material	TD/AVTS/AV05/04/CM

Course Title	**Water and Effluent Analysis**
Purpose	Able to analyses water sample ,can work in water testing department of any industry
Eligibility	B.Sc./M.Sc. with Chemistry or Industrial Chemistry as main subject Or B.Sc. / M.Sc. with Biotech or B. Pharm./M. Pharm.
Duration	10 Days
Location	ATI campus, ATI Main bldg. AVTS chemical, Industrial Chemistry Section
Learning Outcomes	1) Able to find out total alkalinity of any water sample. 2) Can find out total temporary & permanent hardness of any water sample. 3) Can find out chloride contents of given water sample. 4) Can find out DO, BOD, COD of given water sample. 5) Can determine the turbidity, pH, conductivity of given water sample. 6) Able to prepare the solutions of required concentrations which are used in all 7) Above analysis &can handle the instruments properly.
Teaching Methods	1) Lectures in class room 2) Practice sessions or practical's 3) Group exercises or projects 4) Demonstrations 5) Role plays
Assessment Methods	Formative assessment consist of following things:-

Sr. no.	**Criteria for assessment consist of following things:**	**Maximum marks**
1- A	Attendance & punctuality	20
2- B	Sincerity	10
3- C	Ability to grasp the topic	10
V	**Summative assessment through objective type questions consists of following things:**	
Sr. no.	**Criteria for assessment**	**Maximum marks**
1	Test consists of practical knowledge	30
2	Test consists of theoretical knowledge	20

Course Schedule

Day1

1st Session: Introduction to water analysis, sampling process sample collection, sample preservation.

2nd Session: Explanation of experiment no.1alkalinity determination theoretical aspects of alkalinity, procedure for determination preparation of solution, calculation.

Day2

1 &2 Session: Actual performance for different samples & calculation

Day3

1st Session: Explanation of experiment no.2determination theoretical aspects of hardness, procedure for determination, preparation of solution, calculation

2nd Session: Actual performance for different samples & calculation

Day4

1st Session: Explanation of the concept of dissolved oxygen. procedure for determination, preparation of solution, calculation

2nd Session: Actual performance for different samples & calculation

Day5

	1st Session: Explanation of the concept of biological oxygen demand, procedure for determination, preparation of solution, calculation 2nd Session: Actual performance for different samples, sample to be preserved for 5 days in incubator **Day6** 1st Session: Explanation of concept of chloride content of sample determination procedure, preparation of solution actual performance of experiment & calculation 2nd Session: Explanation of the concept of chemical oxygen demand, procedure for determination, preparation of solution, actual preparation of some of the reagents which requires 24 hours for getting clear solution **Day7** 1 & 2 Session: Actual performance for different samples & to carry out COD determination- digestion & titration, calculation **Day8** 1st Session: Explanation on dissolved solids, TDS & procedure for determination. practical to determine pH, colour conductivity & TDS 2nd Session: Practical for determination of BOD &calculation **Day9** 1st Session: Procedure & explanation of Turbidity determination preparation of solution & practical, calculation 2nd Session: Procedure & explanation of nitrate determination preparation of solution & practical, calculation **Day10** 1st Session: Procedure & explanation of sodium, potassium, calcium determination preparation of solution, practical & calculation 2nd Session: Assessment & valediction
AIDS	LCD projection, white board, instrument-UV-VIS spectrophotometer, incubator, flame photometer, Nephelometer, burette pipette conical flask, vol. flasks etc. required AR grade chemicals like, silver sulphate, nitrate, EDTA etc.
Instruction Material	TD/AVTS/AV05/01/CM