CHHATTISGARH SWAMI VIVEKANAD TECHNICAL UNIVERSITY, BHILAI (C.G.)

SCHEME OF TEACHING AND EXAMINATION
SEMESTER VII CHEMICAL ENGINEERING

S. No	Board of Study	Subject Code	Subject	Period per Week			Scheme of Exam Theory/Practical			Total Marks	Credit
				L	T	P	ESE	CT	TA		
1	Chemical Engineering	319731(19)	Petroleum Refinery Engineering	4	1	-	80	20	20	120	5
2	Chemical Engineering	319732(19)	Environment legislation and Impact Assessment	3	1	-	80	20	20	120	4
3	Chemical Engineering	319733(19)	Separation Processes - II	4	1	-	80	20	20	120	5
4	Chemical Engineering	319734(19)	Process Equipment Design-II	4	1	-	80	20	20	120	5
5	Refer Table -II		Professional Elective-II	4	1	-	80	20	20	120	5
6	Chemical Engineering	319761(19)	Petroleum Refinery Engineering - lab	-	-	3	40		20	60	2
7	Chemical Engineering	319762(19)	Separation Processes-II -Lab	-	-	3	40		20	60	2
8	Chemical Engineering	319763(19)	Process Equipment Design-II Viva	-	-	3	40		20	60	2
9	Chemical Engineering	319764(19)	Minor Project	-	-	4	100		40	140	2
10	Management	319765(76)	Innovative and Entrepreneurial Skills	-	-	2	-		40	40	1
11	Chemical Engineering	319766(19)	**Practical Training and Library	-	-	1	-		40	40	1
			Total	**19**	**5**	**16**	**620**	**100**	**280**	**1000**	**34**

Table – II

Professional Elective-II		
Board of Study	**Subject Code**	**Subject**
Chemical	319741(19)	Reactor Design.
Chemical	319742(19)	**Transport Phenomena**
Chemical	319743(19)	Polymer Technology
Chemical	319744(19)	Oil and Fat Technology

Note: 1. All theory papers will be of three hours duration

2. ** To be completed after VI semester and before the Commencement of VII semester

3. 1/4th of total strength of students subject to minimum of 20 students is required to offer an elective in the college in a particular Academic session.

4. Choice of elective course once made for an examination cannot be change in future examination.

L- Lecture, **T**- Tutorial, **P-** Practical, **ESE**- End Semester Exam, **TA-** Teacher's Assessment

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Name of program: **Bachelor of Engineering** Semester: **VII**
Branch: **Chemical Engineering** Code: **319731(19)**
Subject: **Petroleum Refinery Engineering**
Total Theory Periods: **50** Total Tutorial Periods: **12**
Class Tests: **Two (Minimum)** Assignment: **Two (Minimum)**
ESE Duration: **Three Hours** **Maximum Marks: 80** **Minimum Marks: 28**

Course Objectives:

1. This course will present an overview of the modern, integrated petroleum refinery, its feedstocks, product state and the processes employed to convert crude oil and intermediate streams into finished products.
2. This course provides major insights into both primary and secondary processes like Atmospheric Distillation, Vacuum Distillation, Cracking, Hydrocracking, Catalytic Reforming, Coking, Visbreaking in a typical refinery.

Course Outcomes:

1. After undergoing this course the students will acquire knowledge regarding various processes in refinery.
2. After undergoing this course the students will understand about manufacturing process and technical problems associated with these processes.

Unit I Petroleum refining in India: Various petroleum products, Physical properties of petroleum products, World reserves of crude, Production and consumption position, Composition of petroleum crude, Introduction of Refining, Types of refineries Pollution by Refineries, New trends in refinery.

Unit II Distillation and Equilibrium: Dehydration and desalting of crude oil, Reflux ratios, Types of trays, Trays efficiencies, Types of distillation used in petroleum industries, Various units in modern oil refinery, Various petroleum products properties and applications, Treatments of important products (sweetening, dewaxing deoiling, deasphalting).

Unit III Cracking and Coking: Types of cracking, Reactions and operating variables of thermal and catalytic cracking, Visbreaking, Various processes for catalytic cracking (fixed bed, moving bed and fluidized bed catalytic cracking), Deep catalytic cracking, Coking (delayed coking and fluidized bed coking).

Unit IV Reforming & Isomerisation: Types of reforming, Reforming reactions, Catalyst used in reforming, Operating variables, Various processes. Isomerisation reactions. Reformulated gasoline.

Unit V Rebuilding of Hydrocarbons & Pollution by Refineries: Alkylation and its process, Polymerisation and its process, Oxidation, Hydration, Halogenations, Nitration, Depolymerisation, Hydrogenation, Dehydrogenation, Automation in petroleum refinery,

Text books:

1. Sarkar G.N., “Advanced Petroleum Refining”.
2. Sinha N.K.,”Petroleum Refinery and Petrochemicals”, Umesh Publications.

Reference books:

1. Bhaskara Rao B.K.,”Modern Petroleum Refining Processes”.
2. Sharma B.K. “Fuels and Petroleum processing”.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Name of program: **Bachelor of Engineering** Semester: **VII**
Branch: **Chemical Engineering** Code: **319732(19)**
Subject: **Environmental Legislation And Impact Assessment**
Total Theory Periods: **40** Total Tutorial Periods: **10**
Class Tests: **Two (Minimum)** Assignment: **Two (Minimum)**
ESE Duration: **Three Hours** **Maximum Marks: 80** **Minimum Marks: 28**

Course Objectives:

1. The aim of the course is to study about Environmental laws to control and prevent pollution
2. The purpose of the course is to study of Environmental Impact Assessment and Management.

Course Outcomes:

3. After undergoing this course the students will acquire knowledge regarding various processes in refinery.
4. After undergoing this course the students will understand about manufacturing process and technical problems associated with these processes.

Unit I Introduction: Role of National, International and UN Agencies in Dealing With The Environmental Aspects, International Protocols:Kyoto Protocol, Montreal Protocol, Rio Declaration, Concept of Carbon Trading , Cabon footprint and Climate Change

Unit II Significant Legislations in Developing And Developed Countries, Environmental Laws in India: Water (Prevention and Control Pollution) Act, 1974, Air (Prevention and Control Pollution) Act 1981, Wild life Protection Act 1972

Unit III Indian Forest Act 1927 and Amendments, The Environment (Protection) Act, 1986 Issues Involved in Enforcement of Environmental Legislation

Unit IV EIA Methodologies, EIA Notification 2006, Screening and Scoping Criteria, Rapid and Comprehensive EIA, EIA Process in India And Other Countries, Environmental Pollution Indices.

Unit V Environmental Auditing, Biodiversity and its conservation, Preparation of Management Plan

Text Books:

1. Environmental Engineering and Management by Dr.Suresh K. Dhameja Publisher -S.K. Kataria &Sons(2004-2005)
2. Environmental Studies by Dr.Suresh K. Dhameja Publisher-S.K. Kataria &Sons(2006-2007)

Reference Books:

1. Environmental Laws in India – S.K.Shastri
2. G.J. Rau and C.D.Wooten, Environmental impact analysis handbook, McGraw- Hill

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**
Branch: **Chemical Engineering** Semester**: VII**
Subject: **Separation Process –II** Code**: 319733(19)**
Total Theory Periods: **40** Total Tutorial Periods**: 10**
Class Tests: **Two (Minimum)** Assignments:**Two (Minimum)**
ESE Duration: **Three Hours** **Maximum Marks: 80** **Minimum Marks: 28**

Course Objectives:

1. To impart the basic concepts of mass transport.
2. To develop understanding about, humidification, crystallization drying. Extraction and Leaching operations and problems.
3. To impart the basic concepts of mass transfer in, humidification, crystallization drying. Extraction and Leaching process and parameters.
4. To develop understanding about design and analysis of humidification, crystallization drying. Extraction and Leaching units

Course outcomes:

1. Create awareness among students with new and unconventional separation processes; acquire sufficient knowledge in energy intensive processes for separation of components, Students will be equipped with the applications in Down-streaming processes
2. Mechanisms: Separation factors and its dependence on process variables, classification and characterization, thermodynamic analysis and energy utilization, kinetics and mass transport.
3. Theory of cascades and its application in single and multistage operation for binary and multi component separations.

UNIT- I **Crystallization:** Introduction to Crystallization**,** Classification of Crystallizer, Equilibrium data (Solubility), Calculation of Yields, Material and Energy balance, Theory of Crystallisation, Miers super saturation theory, Nature of Nucleation's, Rate of Crystal growth.

UNIT- II **Humidification:** Humidification and Air Conditioning, Humidity Chart (Phychrometric Chart) and use, Wet bulb and Dry bulb temperature, Adiabatic Cooling line, General case of interaction between humid air and water, Levies relation, Dehumidification.

UNIT- III **Drying:** Introduction to Drying**,** Phase Equilibrium Moisture, Bound and Unbound Moisture, Free Moisture, Drying operation-Constant drying rate, Drying Curve, Calculation the drying time under constant drying conditions.

UNIT- IV **Extraction:** Liquid extraction, Liquid equilibrium, System of Three Liquids-one Pair Partially soluble, Choice of Solvents, Stage wise Contact-Single Stage Extraction, Multi stage cross current extraction, Insoluble Liquids, Continues counter current multistage extraction.

UNIT- V **Leaching:** Introduction to Leaching**,** (Solid-Liquid Extraction), Factor's affecting leaching operations, Single stage leaching, Multistage cross current leaching, Multistage counter current leaching, Solid –Liquid Extraction calculation-Triangular diagram.

Text Books:

1. 1. Treybal R.E., Mass Transfer Operations, McGraw Hill
2. McCabe W.L., Smith J.C. & Harriott P., Unit Operations in Chemical Engineering, McGraw Hill
3. Coulson J.M. & Richardson J.F., Chemical Engineering, Vol. II, ELBS, Pergamon

Reference books:

1. Seader J.D.& Henley E.J Separation Process Principles Wiley India.
2. Foust A.S. et al, Principles of Unit Operations, John Wiley
3. Geankoplis C.J., Transport Processes and Unit Operations, Prentice Hall India.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**
Branch: **Chemical Engineering** Semester: **VII**
Subject: **Process Equipment Design – II** Code: **319734(19)**
Total Theory Periods: **40** Total Tutorial Periods: 12
Class Tests: **Two (Minimum)** **Maximum Marks: 80** **Minimum Marks: 28**
ESE Duration: **Four Hours**

Course Objectives:

1. Process Equipment Design course in Chemical Engineering is designed to understand the design parameters of various types of heat exchangers, evaporators and dryers used in chemical plants.
2. The subject includes design of parallel counter flow double pipe heat exchangers, 1-2 parallel counter flow shell and tube heat exchangers including heaters, coolers and subcoolers, single and multiple effect evaporators, and dryers.

Note: Questions from Unit-I of 40 marks will be compulsory.

UNIT I Double pipe heat exchanger

Counter flow type double pipe heat exchangers in series-parallel arrangement, Concept of equivalent diameter, Equivalent diameters in tube and annulus, Film coefficients for fluids in pipe and annulus, Pressure drops in pipe and pipe annuli, Use of Kern's design data and conversion factors.

Shell and Tube Heat Exchangers

Components of a shell and tube heat exchanger- tubular elements, shell and shell cover, channel cover, tube sheet, baffles, tie rods and spacers, Codes and standards for heat exchangers, General design considerations.
Heaters and coolers: Stream temperatures, LMTD and correction factor, Fluid allocation, Calculation of equivalent diameters- tube side and shell side, Mass velocities on shell side and tube side, Fluid velocities and Reynolds number calculation, Shell side and tube side heat transfer coefficients, Dirt factor, Area of heat exchangers and pressure drop calculation..

UNIT II Condensers: Film and drop wise condensation, Condensation outside and inside horizontal tubes, Condensation inside and outside vertical tubes, Condensation of steam, Mean temperature difference, Condensation of a single vapour, Condensing film coefficients in horizontal and vertical heat exchangers, Pressure drop in condensers.

UNIT III Evaporators: The mechanism of vaporization, Use of steam tables, Classification of vaporizing equipment, Multiple-effect evaporation-forward feed, backward feed and mixed feed, Vacuum operation of a process, Barometric condensers, Chemical evaporators, Forced circulation evaporators, Boiling point elevation, Material and energy balances for an evaporator, The calculation of chemical evaporators- Design of a multiple effect chemical evaporators with and without boiling point rise.

Text book:

1.Donald Q Kern, 'Process Heat Transfer', Tata McGraw- Hill Publishing Company Limited, 2007

Reference book:

1. J.M. Coulson, J.F. Richardson and R.K. Sinott, "Chemical Engineering-Vol. 6" by Pergamon Press, 4th Edition, 2010.

Course Outcome:

The course is meant for understanding the design approaches and methods of scientific and engineering principles of designing, debottlenecking and troubleshooting of heat exchangers in a chemical plant.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Name of program: **Bachelor of Engineering** Semester: **VII**
Branch: **Chemical Engineering** Code: **319761(19)**
Subject: **Petroleum Refinery Engineering Lab**
Total Lab Periods: **36** Batch Size: **15**
Maximum Marks: 40 **Minimum Marks: 20**

List of Experiments *(At least Ten experiments are to be performed by each student)*

1. To determine the viscosity of the given petroleum product and to study the variation of viscosity with respect to temperature.
2. To determine the distillation characteristics (boiling range) of the given sample using the distillation apparatus.
3. To separate a binary mixture by distillation method.
4. To determine the flash and fire point of different petroleum products.
5. To determine the cloud and pour point of different petroleum products.
6. To determine the density of different petroleum products.
7. To determine the moisture content of a given petroleum sample.
8. Ash test of given lubricating oil.
9. To determine the physico-chemical properties by blending of petroleum products.
10. To determine the refractive index of petroleum products.
11. To determine the API gravity of crude petroleum and liquid petroleum products by hydrometer method and specific gravity bottle method.
12. To determine the kinematic viscosity of the given sample of oil at various temperatures and to study the corresponding variation with respect to temperature.
13. To determine the calorific value of given fuel oil sample.

Equipments/Machines/Instruments/Tools Required:

1. Oven
2. Electronic balance
3. hydrometer
4. Water bath
5. Agitator
6. Viscometer
7. Pensky-Marten apparatus
8. Cloud and Pour point apparatus
9. Bomb calorimeter
10. Furnace

Recommended Books:

1. Sarkar G.N., “Advanced Petroleum Refining”.
2. Sinha N.K., “Petroleum Refinery and Petrochemicals”, Umesh Publications.
3. Bhaskara Rao B.K., “Modern Petroleum Refining Processes”.
4. Sharma B.K. “Fuels and Petroleum processing”.
5. S.S. Dara “Experimental Chemistry”.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Name of program: **Bachelor of Engineering**
Branch: **Chemical Engineering** Semester: **VII**
Subject**: Separation Process –II Laboratory** Code:**319762(19)**
Total Lab Periods: **3 6** Batch Size: **15**
Maximum Marks: **40** Minimum Marks: **20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. To determine the crystal yield of given sample (with seeding)
2. To determine the crystal yield of given sample (with out seeding)
3. To prepare the ternary phase diagram (Binodal curve) for the given ternary system.
4. To draw the line and hence determine the plait point for ternary system Acetic Acid-Chloroform-Water.
5. To plot the drying rate curve for wet solid.
6. To determine the effect of solvent ratio in % recovery in leaching and to plot the overflow and underflow curve for sand and salt water system.
7. Study of Fluidized Bed Dryer.
8. Study of Spray Dryer.
9. Study of Batch Crystallizer.
10. To determine the Drying Rate by Vacuum Tray Dryer.
11. Study of Cooling Tower.
12. Study of Liquid-Liquid extraction by York-Shiebel Extraction Apparatus.
13. Study of Solid –Liquid Extraction Unit.

List of Equipments/Machines Required

_ Crystallizer
_ Cooling Tower
_ Spray Dryer
_ York-Shiebel Extraction Apparatus
_ Vacuum Tray Dryer
_ Fluidized Bed Dryer
_ Solid –Liquid Extraction Unit
_ Oven
_ Weighing Balance
_ Hot Plate
_ Water bath
_ Agitator

Recommended Books:

1. McCabe & Smith, Unit Operation of Chemical Engineering.
2. Treybal , Mass Transfer Operations
3. Badger & Banchero, Introduction to Chemical Engineering

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**
Branch: **Chemical Engineering** Semester :**VII**
Subject : **Process Equipment Design-II Viva** Practical Code :**319763(19)**
Total Practical periods: **40** Total ESE Marks: **40**
Batch Size: **15**

Viva- Voice Examination Based on Syllabus for Process Equipment Design-II Theory, to be conducted

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Name of program: **Bachelor of Engineering** Semester: **VII**
Branch: **Chemical Engineering** Code : **319741(19)**
Subject: **Reactor Design**
Total Theory Periods: **50** Total Tutorial Periods: **12**
Class Tests: **Two (Minimum)** Assignment: **Two (Minimum)**
ESE Duration: **Three Hours** **Maximum Marks: 80** **Minimum Marks: 28**

Course Objectives:

2. The aim of the course is to study about chemical reactors.
3. The purpose of the course is to study the design aspects for different chemical reactors.

Course Outcomes:

1. After undergoing this course the students will acquire knowledge regarding design of chemical reactors.

Unit I Behavior of Chemical Reactors: Ideal & Non-Ideal Flow; Classification of Reactors: Isothermal, Ideal batch, CSTR, PFR, Multiple reactors, Non-isothermal reactors, Multiplicity, Non-ideal reactors, Fluid solid non-catalytic reactions, Fluidized beds.

Unit II Introduction to Reactor Design: Detailed Design of Batch Reactors.

Unit III Flow Reactors: Detailed design for CSTR; CSTR design; Single CSTR battery; CSTR at differential temperature etc.

Unit IV Detailed Design for Plug Flow Reactor: Single; Series and Parallel; Mixed reactor (Combination); Reactor stability.

Unit V Design aspects for Non-ideal reactors.

Text Books:

1. J.M. Smith, “Chemical Engineering Kinetics”.
2. Octave Levenspiel, “Chemical Reaction Engg.”.

Reference Books:

1. H.Scott Fogler, “Chemical Reaction Engg”.
2. S.D.Dawande, “Chemical Reaction Engg”.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**
Branch: **Chemical Engineering** Semester: **VII**
Subject: **Transport Phenomena** Code : **319742 (19)**
Total Theory Periods: **40** Total Tutorial Periods: **10**
Class Tests: **Two (Minimum)** Assignments: **Two (Minimum)**
ESE Duration: **Three Hours** M**aximum Marks: 80** **Minimum Marks: 28**

Course Objectives:

1. The course will acquaint the students with topics in transport phenomena (momentum, heat and mass transport).
2. The Focus will be to develop physical understanding of principles discussed and with emphasis on chemical engineering applications. In addition to the text, the student will be exposed to classic and current literature in the field.

Course outcomes:

1. Ability to set up and solve differential momentum, heat and mass balances for 1-D steady state problems and quasi-steady-state problems occurring in laminar and turbulent flows in terms of vector and tensor fluxes.
2. Formulate conservation statements in heat, mass, and momentum at multi scales from microscopic to macroscopic in both steady and unsteady modes.
3. Analyze advanced transport problems in heat, mass, and momentum, both macroscopic and microscopic formulate simultaneous energy and mass balances in chemical processes.

UNIT- I Introduction to transport phenomena General Molecular Transport Equations, Molecular Heat Equation, Molecular Momentum Equation, Molecular Mass Equation, Newtonian and non Newtonian Fluids. Falling Film in Laminar Flow, Flow through Circular Tubes, Annulus and Rectangular Duct, Adjacent flow of Immiscible Liquids between two Parallel plates, Couette Flow

UNIT- II Momentum balance - boundary conditions - application of shell balance to simple flow systems Equation of Continuity, Rectangular, Cylindrical & Spherical Co-ordinates, Equation of Motion, Use of Equations of Continuity & Motion, Tangential Annular Flow, Shape of Cylindrical Surface, Vortex Depth

.**UNIT- III** Introduction to heat transport Shell energy balance - boundary conditions - application of shell balance to heat conduction problems - conduction– Fourier's Law of heat conduction, temperature and pressure Dependence of thermal conductivity of gases and liquids, thermal conductivity of Solid

UNIT- IV Heat Transport through Composite wall, through composite Cylinder with electrical Heat Source, with Nuclear Heat Source, Due to Viscous Dissipation through Fin, Convection heat transfer co-efficient.

UNIT- V Introduction to mass transport Shell mass balance - boundary conditions , diffusivity and mechanism of mass transform, diffusion in gases at low density , diffusion in liquids , diffusion through spherical film, diffusion in liquid , mass transfer with chemical reaction.

Text Books:

1. R.B. Bird, W.E. Stewart and E. W.Lighfoot, “Transport Phenomena”, John Wiley & Sons.
2. Brodkey, R. S. and Hershey, H. C., “Transport Phenomena”, McGraw-Hill
3. Welty, J.R., Wicks, C.W., Wilson, R.E. and Rorrer, G., “Fundamentals of Momentum Heat and Mass Transfer”, John Wiley & Sons

Reference books:

1. C. J. Geankopolis, Transport Processes in Chemical Operations, 3rd Ed., Prentice Hall of India, New Delhi, 1996.

Course outcomes:

1 After studying the students are able to treat industrial effluent.

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Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Name of program: **Bachelor of Engineering** Semester: **VII**
Branch: **Chemical Engineering** Code : **319743(19)**
Subject: **Polymer Technology**
Total Theory Periods: **50** Total Tutorial Periods: **12**
Class Tests: **Two (Minimum)** Assignment: **Two (Minimum)**
ESE Duration: **Three Hours** **Maximum Marks: 80** **Minimum Marks: 28**

Course Objectives:

4. The aim of the course is to study about manufacturing processes of polymers.
5. The purpose of the course is to study the characteristics, testing and processing of polymers.

Course Outcomes:

1. After undergoing this course the students will acquire knowledge regarding manufacturing processes, characteristics, testing and processing of polymers.

Unit I Characteristics and Analysis of Polymers: The science of large molecules, Theory of polymer solutions, Measurement of molecular weight and size, Analyzing and testing of polymers.

Unit II Polymer Material Structure and Properties: Deformation, Flow and melt characteristics.
Morphology and other crystalline polymers, Rheology and mechanical properties of polymers, Polymer structure and physical properties.

Unit III Polymer Synthesis and Reaction Engineering: Condensation polymerization, Addition polymerization, Ionic and Coordination polymerization, Copolymerisation, Polymerization conditions and polymer reactions.

Unit IV Industrial Polymers, Manufacturing Processes and Applications Hydrocarbon plastics and elastomers, other carbon chain polymers, Heterochain thermoplastics, Thermosetting resins.

Unit V Processing of Polymers: Plastics, Fibers and Elastomers, Polymers developed for synthetic plastics, Fibers and elastomer applications, Plastics technology, Fiber technology and Elastomer Technology.

Text Books:

1. F.W.Billmeyer, Text Book of Polymer Sciences,3rd Ed., Wiley Inter Science,1984.
2. Dawande S.D., Introduction to Polymer Science & Technology, Denett .Co.

Reference Books:

1. F. Rodriguez, Principles of polymer systems, 4th Ed., Taylor and Francis,Washington, 1996.
2. Encyclopedia of Polymers Science and Technology, John Wiley-Inter Science.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Name of program: **Bachelor of Engineering** Semester: **VII**
Branch: **Chemical Engineering** Code: **319744(19)**
Subject: **Oil and Fat Technology**
Total Theory Periods: **50** Total Tutorial Periods: **12**
Class Tests: **Two (Minimum)** Assignment: **Two (Minimum)**
ESE Duration: **Three Hours** **Maximum Marks: 80** **Minimum Marks: 28**

Course Objectives:

1. The aim of the course is to study about processing of oil and fats.
2. The purpose of the course is to study the characteristics, chemistry, Extraction and application of fats and oils.

Course Outcomes:

1. After undergoing this course the students will acquire knowledge regarding processing, characteristics, chemistry, extraction and application of fats and oils.

Unit I Lipids: Biological significance, classification occurrence and chemistry, Triglycerides and Phospholipids, Emulsions and emulsifiersl, Soaps, Detergents, Polishes and paints, Inter esterifications, Industrial fats and oils.

Unit II Saturated and unsaturated fatty acid and their properties: Enzymatic and chemical spoilage, Shortenings, Butter substitutes, Salad oils, Margarine, Non-caloric fats, Standard and quality control, Packaging and storage of fats and fatty foods.

Unit III Extraction of oils and fats: Rendering and trying out, Mechanical expression, Hydraulic pressing and expelling, Solvent extraction and pre – press solvent extraction, Degumming and dewaxing, Alkali treatment, Bleaching and deodorization.

Unit IV Refining of oils: Physical and chemical, Hydrogenation of unsaturated fats and oils, Changes during processing and storage of oils and fats, Polymorphism, Rancidity and reversion, Processing of oil seeds and other oil bearing materials.

Unit V Non conventional edible oils, oil seed cakes and meal utilization: By products of oils and fats processing industries, Oleoresins and essential oils, Characteristics, Chemistry, Extraction and application, Toxicity and safety of fats and oils.

Text Books:

1.D. Swarn, Bauleys, “Industrial Oils and Fats Products”, 4th edition Vol I and II.
2.Edgar Wodlatt , “The Manufacture of Soaps, Detergent and Glycerin”, 1st edition eclis horwod.

Reference Books:

1. John Murray, “Fats, Oils and Waxes”.
2. G. N. Pandey , “Chemical Technology” Vol II.