

Program of:

**Science and Technology
of Sugar Industry Diploma
(Engineering Section)
(Program Scheme and
Courses Content)**

**Program of: Science and Technology
of Sugar Industry Diploma
(Engineering Section)**

First Year: First Semester

Code	Course Title	No. H.	Prac. H.	Exams		Grade
				Y.W.	Wr.	
SE5101	Advanced Thermodynamics.	2		30	70	100
SE5102	Material Handling Systems.	2		30	70	100
SE5103	Company Laws and Work Legislation	2		30	70	100
SE5104	Sugar Crops Production.	4		60	140	200
SE5105	Language.	2		30	70	100
	Elective Courses (A)*	2		30	70	100
	Elective Courses (B)**	2		30	70	100
	Total	16		240	560	800
	* Elective Courses (A) Choose one from the following:	Note: Course Code Description: Course Name: AB CDEF (AB): is an indicator for the diploma name. (C) : is a number for graduate course level (from 1 to 4). (D) : is a number indicating the semester number. (EF): is a number indicating the serial number of the course during the semester.				
SE5106	Theory of Drying and its Applications in Sugar Industry.					
SE5107	Machine Elements.					
SE5108	Engineering Materials.					
	** Elective Courses (B) Choose one from the following:					
SE5109	Electrical Power and Machine.					
SE5110	Elevators and Conveyors.					
SE5111	Electrical Design and Wiring.					
*** Extended courses						

**Program of: Science and Technology
of Sugar Industry Diploma
(Engineering Section)**

First Year: Second Semester

Code	Course Title	No. H.	Prac. H.	Exams		Grade					
				Y.W.	Wr.						
SE5201	Applications of Heat and Mass Transfer.	2		30	70	100					
SE5202	Technology of Sugar Industry (I).	4		60	140	200					
SE5203	Pollution Control in Sugar Factories	2		30	70	100					
SE5204	Economic and Management of Sugar Factories.	2		30	70	100					
SE5205	Technical Writing.	2		30	70	100					
	Elective Courses (A)*	2		30	70	100					
	Elective Courses (B)**	2		30	70	100					
	Total	16		240	560	800					
	* Elective Courses (A) Choose one from the following:										
SE5206	Basics of Industrial Maintenance and its Applications										
SE5207	Process Control.										
SE5208	Steam and Gas Turbines										
	** Elective Courses (B) Choose one from the following:										
SE5209	Industrial Electronics and Applications										
SE5210	Renewable Energy Sources										
SE5211	Special Electrical Machines										
*** Extended courses											

**Program of: Science and Technology
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(Engineering Section)**

Second Year: First Semester

Code	Course Title	No. H.	Prac. H.	Exams		Grade
				Y.W.	Wr.	
SE5301	Boilers and Heat Exchangers	2		30	70	100
SE5302	Research Project***.	2		---	---	---
SE5303	Technology of Sugar Industry (II).	4		60	140	200
SE5304	Engineering Laboratory (I)***	---	4	25	25	50
SE5305	Computer Programming.	2		30	70	100
	Elective Courses (A)*	2		30	70	100
	Elective Courses (B)**	2		30	70	100
	Total	14	4	205	440	650
	* Elective Courses (A) Choose one from the following:					
SE5306	Pumps and Hydraulic Systems.					
SE5307	Computer Systems and Performance Evaluation.					
SE5308	Quality and Management.					
	** Elective Courses (B) Choose one from the following:					
SE5309	Plant Equipment Planning.					
SE5310	Electrical Energy Distribution.					
SE5311	Programmable Logic Controllers (PLC) and its Applications					
*** Extended courses						

**Program of: Science and Technology
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Second Year: Second Semester

Code	Course Title	No. H.	Prac. H.	Exams		Grade
				Y.W.	Wr.	
SE5401	Measurements and Control (Theory and Operation).	2		30	70	100
SE5402	Research Project***	2		50	50	100
SE5403	Technology of Sugar Industry (III).	4		60	140	200
SE5404	Engineering Laboratory***		4	25	25	50
SE5405	Statistical Analysis.	2		30	70	100
	Elective Courses (A)*	2		30	70	100
	Elective Courses (B)**	2		30	70	100
	Total	14	4	255	495	750
	* Elective Courses (A) Choose one from the following:					
SE5406	Elements of Power Transmission and Mechanical Vibration.					
SE5407	Power Stations Engineering and Economics.					
SE5408	Design of Industrial Waste Treatment System.					
	** Elective Courses (B) Choose one from the following:					
SE5409	System Analysis in Sugar Industry.					
SE5410	Variable-Speed Drives.					
SE5411	Marketing Research.					
SE5412	Project Economics.	*** Extended courses				

First Year: First Semester

SE5101- Advanced Thermodynamics: (2 h/w)

- 1- Introduction, definitions and basic concepts.
- 2- Thermodynamic properties of mixtures and solutions.
- 3- Thermodynamic laws and their important relations.
- 4- Reversibility, available energy and maximum energy for natural processes and chemical reactions.
- 5- Cycles, steam and gas power generation.
(Description of cycles and their improvements – Types of steam turbines – Internal combustion engines).
- 6- Thermodynamics for chemical reaction (Analytical study).
- 7- A practical study from sugar manufacturing processes.

SE5102- Material Handling Systems: (2 h/w)

- 1- General properties of material.
- 2- General theory for operating material handling system.
- 3- Relation between industrial process and handling system.
- 4- Method of selection.
- 5- Auxiliary equipment.
- 6- Control and equipment.
- 7- Case study.

SE5103- Company Laws and Work Legislations: (2 h/w)

- 1- Law of work.
- 2- Individual and Group work contracts.
- 3- Decrees of syndicates and companies.
- 4- Delimitations of employing delinquents and women, Foreigners working for Egyptians and Egyptians working for foreigners.
- 5- Arabic and International work agreements.
- 6- Law of Social Insurance.
- 7- Kinds of social Insurance.
- 8- Study of decrees related to Special kind of Insurance.
- 9- Distinguishing between decrees of social insurance and other kinds of Insurance.

Note: This Course of Companies Laws and Work Legislations is to be taught to all specialties.

SE5104- Sugar Crops Production: (4 h/w)

Production of Sugar Cane:

- 1- Economic importance.
- 2- History and current status of cane in Egypt.
- 3- Origin and classification of sugar cane.
- 4- Botany.
- 5- Growth stages.
- 6- Sugar formation, transportation and storage.
- 7- Cultural practices.
- 8- Harvest.
- 9- Core of rations.
- 10- Mechanization of cane.

Production of Sugar Beet:

- 1- Economic importance.
- 2- World distribution.
- 3- status in Egypt.
- 4- Origin.
- 5- Botany and classification.
- 6- Sugar beet environment.
- 7- Thermal and light responses.
- 8- Growth relations and stages.
- 9- Flowering and seed setting.
- 10- Cultural practices in Egypt.

Note: This Course of Sugar Crops Production is to be taught to all specialties.

SE5105- Language: (2 h/w)

- 1- Introduction.
- 2- Characteristics of the technical English.
- 3- Review of the English grammar.
- 4- Active sentences and its characteristics.
- 5- Some of the common errors in writing technical English sentences.
- 6- Phrasing: (Main idea – Methods of explaining the main idea – Types of phrases – Reading and analyzing some of the technical writing to develop the communication skills).

Note: This Course of Language is to be taught to all specialties.

Elective Courses
(First Year - First Semester) List (A)

SE5106- Theory of Drying and its Applications in Sugar Industry:
(2h/w)

- 1- General principles.
- 2- Rate of drying (Constant rate period – First falling rate period – Second falling rate period – Time for drying).
- 3- The mechanism of moisture movement during drying (Falling rate period – Capillary theory of drying).
- 4- Drying operations (Batch drying – The mechanism of batch drying – Continuous drying).
- 5- Dryers (Classification and selection – Layout and performance data – Prediction of drying rates – Prediction of residence times with prescribed material flow - Prediction of residence times with non-prescribed material flow – Practical dryer design).
- 6- Drying of sugar.
- 7- Drying of bagasse.

SE5107- Machine Elements: (2 h/w)

- 1- Stress analysis in machine elements.
- 2- Types of joints.
 - a) Bolted joint.
 - b) Riveted joint.
 - c) Welded joint.
 - d) Keys and splines.

SE5108- Engineering Materials: (2 h/w)

- 1- Atomic structure.
- 2- Ferrous alloys.
- 3- Mechanical testing and properties.
- 4- Nonferrous alloy.
- 5- Ceramic Materials.
- 6- Polymers.
- 7- Composite materials.
- 8- Construction Materials.
- 9- Corrosion and wear.
- 10- Physical properties of engineering materials (Electrical, Magnetic, Optical and Thermal).

Elective Courses
(First Year - First Semester) List (B)

SE5109- Electrical Power and Machines: (2 h/w)

Electrical Machines:

- 1- Connections of 3-phase transformers.
- 2- Loading of D.C. motors.
- 3- Dynamics of induction and instantaneous motors.

Electrical Power:

- 1- Power transmission lines (open air T.L., underground cables).
- 2- Electrical power transmission station.
- 3- Earthing methods and its importance.
- 4- Electrical power network analysis.
- 5- Protection methods.

SE5110- Elevators and Conveyors: (2 h/w)

A- Elevators:

- Traffic analysis (population density – car size – probable number of stops – door operation – traveling time)
- Accommodation (well – pit depth – landings – machine room – noise – fire precautions).
- Type of drives (traction drive – sheaves).
- Roping systems and ropes.
- Motors.
- Brakes.
- Gearing.
- Cars, counterweights and guides.
- Gates, doors and locks.
- Car operating and indicating equipments.
- Safety features.
- Floor leveling.
- Car control system.
- Controllers.

B- Conveyors:

Types of conveyors – control of conveyors – conveyors employing linear motors.

SE5111- Electrical Design and Wiring: (2 h/w)

- Planning for electrical design.
- Lighting and appliance branch circuits.
- Motor branch circuits control circuits.

- Feeder for lighting and power.
- Motor feeders.
- Transformer applications (to 600 volts).
- Services.
- Equipment selection and layout.
- High voltage systems (over 600 volts).

First Year: Second Semester

SE5201- Applications of Heat and Mass Transfer: (2 h/w)

- 1- Modes of heat transfer.
- 2- Heat conduction.
- 3- Determination of heat transfer coefficient by convection.
- 4- Radiation heat transfer in gases.
- 5- Heat transfer during condensation and evaporation.
- 6- Applications in furnaces and heat exchangers.
- 7- Introduction of mass transfer.
- 8- Mass diffusion – Fick's law – Equation of mass balance in chemical reaction.
- 9- Applications of mass transfer in physical and chemical operations in sugar industry.
- 10- Applications of combined mass and heat transfer.

SE5202- Technology of Sugar Industry (I): (4 h/w)

- 1- Juice clarification and purification of impurities and non sugar substances which adverse crystallization process.
- 2- Analysis and chemical composition of cane juice as well as physical properties.
- 3- Different methods of clarification as:
 - a) Use of lime solution and $P_2 O_5$ (Source of $P_2 O_5$ is tri-calcium phosphate).
 - b) Use of lime solution and CO_2 after its purification to produce active calcium carbonate.
 - c) Details of chemical reactions in each method.
 - d) Advantages and defects of each method.
 - e) Sulphitation of syrup.
- 4- Refining of Egyptian raw sugar and imported.
 - a) Affination of raw sugar to remove film of non sugar from crystals in centrifuges and soluble sugar to solution.
 - b) Chemical treatment using lime and CO_2 (carbonation).
 - c) Chemical reaction which cause and factors, affect on reactions.

- d) Purification of CO₂ and its chemical neutralization.
- e) Use of phosphatation method to clarification sugar soluble solution.
- f) Decolourization of sugar soluble solution by bone char, activated carbon, resins- advantage and defects of each method.
- g) Boiling system refining factories.

Note: This Course of Chemical Unit Processes in Sugar Production is to be taught to all specialties.

SE5203- Pollution Control in Sugar Factories: (2 h/w)

- 1- Sources of air pollution and emission.
- 2- Environmental impact of air pollution.
- 3- Thermodynamics, chemical kinetics and air pollution.
- 4- Meteorology and natural purification processes.
- 5- Engineered system for air pollution control.
- 6- Particles, its measurements and control.
- 7- Measurements and analysis of air pollutants.
- 8- Sources and control of water pollution in sugar industry.
- 9- Engineered system for water pollution control.

Note: This Course of Pollution Control in Sugar Factories is to be taught to all specialties.

SE5204- Economic and Management of Sugar Factories: (2 h/w)

- 1- Principles and rules of production economics determining the use of agricultural resources in sugar production.
- 2- Economic and productive efficiency in sugar industry.
- 3- Risk and uncertainty in sugar production.
- 4- Economic of scale.
- 5- Technological changes of sugar industry.
- 6- Planning of sugar factories – using some operations research tools, such as linear programming method and transportation models.
- 7- Practical and applied management of sugar factories.
- 8- Economic feasibility study of sugar factories and its financial analysis.

Note: This Course of Economic and Management of Sugar Factories is to be taught to all specialties.

SE5205- Technical Writing: (2 h/w)

- 1- Elements of technical reports.
- 2- Methods of engineering writing.
- 3- Methods of analyzing the engineering data.
- 4- Correct expressions and analytical reading.
- 5- Report of projects.
- 6- Report of experiments.
- 7- Assignment reports.

Note: This Course of Technical Writing is to be taught to all specialties.

Elective Courses

(First Year - Second Semester)List (A)

SE5206-Basics of Industrial Maintenance and its Applications:(2h/w)

- 1- Maintenance and its terminology–maintenance planning–preventive maintenance.
- 2- Maintenance mathematical models-symbolic models in maintenance.
- 3- Planning and scheduling in maintenance - planning and management of spare parts.
- 4- Work evaluation in maintenance.
- 5- Incentives in maintenance.
- 6- Data base in maintenance.
- 7- Reliability engineering and maintenance.
- 8- Applications and case studies.
- 9- Rules of maintenance for mechanical and electrical units.

SE5207- Process Control: (2 h/w)

- 1- Introduction.
- 2- Process system and process models.
- 3- Process control of basic functions.
- 4- Process control of the common unit processes.
- 5- Process control in large industrial complexes

SE5208- Steam and Gas Turbines: (2 h/w)

- 1- Turbines (Introduction - The impulse principle – Impulse turbines – The reaction principle – Reaction turbines – Turbine losses – Turbine efficiencies – Turbine arrangements – Gas turbines).
- 2- Gas Turbines and Combined Cycles (Introduction - Gas turbine cycles - The ideal Brayton cycle - The non-ideal

Brayton cycle - Modifications of the Brayton cycle - Cycle analysis with variable properties - Design for high temperature).

- 3- Combined Cycles (General - Combined cycles with heat recovery boiler -The STAG combined cycle power plant - Combined cycles with multi-pressure steam - A combined cycle for nuclear power plant).

Elective Courses

(First Year - Second Semester)List (B)

SE5209- Industrial Electronics and Applications: (2 h/w)

Part one:

- 1- Introduction to semiconductors.
- 2- Junction between semiconductors: Diode – Transistors.
- 3- Operational amplifier (characteristics, description, applications).
- 4- Semiconductor junction in control systems.

Part two:

- 1- Binary and other counting systems.
- 2- Counting in the binary system.
- 3- Logic Circuits: Gates (AND,OR,NOK,NANO,NOT), Flip-Flop, displacement recorder, counters.
- 4- Summers: half summers – total summers.
- 5- Circuits of Mathematical Process: sum, subtract, multiplication, division.

SE5210- Renewable Energy Sources: (2 h/w)

- Fundamentals.
- Essentials of fluid mechanics.
- Heat transfer solar radiation.
- Solar water heating.
- Other uses of solar heat.
- Photovoltaic generation.
- Hydro – power.
- Power from the wind.
- Biofuels.
- Wave energy.
- Tidal power.
- Geothermal energy.
- Energy storage and distribution.

SE5211- Special Electrical Machines: (2 h/w)

- Single – phase induction motor.
- Two – phase servomotor.
- Reluctance motor.
- Tacho – generator.
- Stepper motor.
- Synchros – linear motors.
- Universal motor – schragc.

Second Year: First Semester

SE5301- Boilers and Heat Exchangers: (2 h/w)

1- Boilers:

(types, fuels, accessories, type of air and water flows, products of combustion, performance and maintenance evaluation feed water and heater).

2- Heat Exchangers:

- a) Types of heat exchangers, functions and applications.
- b) Evaluation of the performance of heat exchangers for a given operating conditions.
- c) Consideration of selection and design of a heat exchanger.
- d) Heaters and evaporation of chemical solutions.
- e) Condensers (water and solutions vapors).
- f) Cooling towers and radiators.
- g) Case study (evaluation of performance and rough estimate calculations).

SE5302- Research Project: (2 h/w)

The project must be in one of Scopes of Engineering topics that deal with Sugar Industry.

SE5303- Technology of Sugar Industry (II): (4 h/w)

- 1- Definition of sugar manufacture and introduction on manufacture steps.
- 2- Cane preparation.
- 3- Extraction of the juice by milling and diffusion.
- 4- Filtration of mixed juice.
- 5- Heating of the juice.
- 6- Clarification of the juice after treatment by precipitation.

- 7- Filtration of scum.
- 8- Filtration of clarified juice outside clarification tanks.
- 9- Juice concentration by evaporation of water by multiple evaporation – explain design principles of multiple.
- 10- Cleaning heat surface of heaters, bodies of multiple evaporation of pan boiling.
- 11- preparation of super-phosphate solution.
- 12- preparation of lime solution.
- 13- preparation of So.
- 14- Design and calculation capacity of instrument for each steps which mention previously.

Note: This Course of Unit Processes in Sugar Production (I) is to be taught to all specialties.

SE5304- Engineering Laboratory: (4h/w)

- 1- Introduction.
- 2- Heat transfer laboratory.
- 3- Fluid mechanics laboratory.
- 4- Steam power generation laboratory.

SE5305- Computer Programming: (2 h/w)

- 1- Computer components (computer generation – components – input and output units – control unit – microprocessor – memory – decimal operational system and special letters and characters).
- 2- Basic Programming.
- 3- Fortran Programming.
- 4- Cobol Programming.

Note: This Course of Computer Programming is to be taught to all specialties.

Elective Courses

(Second Year - First Semester)List (A)

SE5306- Pumps and Hydraulic Systems: (2 h/w)

- 1- Theories of hydraulic systems.
- 2- Theories of valves.
- 3- Theories of pumps.
- 4- Pumps- valve relations in hydraulic circuits.
- 5- Valve selection.
- 6- Design of hydraulic circuits.
- 7- Case study.

SE5307-Computer Systems and Performance Evaluation: (2h/w)

Provides a comprehensive overview of the quantitative aspects of computer systems with a particular focus on performance evaluation. Topics include performance measurement, the analysis and interpretation of measurement data, workload characterization and modeling, the design and evaluation of performance experiments, and the design and application of analytical techniques. A variety of application domains will be considered.

SE5308- Quality and management: (2h/w)

- Quality processes throughout the world.
- Management principles.
- Quality management principles.
- ISO 9000 and ISO 14000 registration.
- Quality function deployment.
- Certification and communication.

Elective Courses

(Second Year - First Semester)List (B)

SE5309- Plant Equipment Planning: (2h/w)

Design and building up of chemical plants. The role of chemical engineer at design of chemical plants. Material and heat balance in projection. Utilization of static and dynamic simulations in design Transport and dimension of traffic in chemical plants. Energy transfer, heating - cooling, Separation processes in inorganic technology. Absorbers and their characteristics. Drying, types and characteristics of driers. Crystallization, types and characteristics of equipments, Reactors, design and bases for calculation. Simple calculation of ideal reactors, Project equations for tube and batch reactors. Calculation of nonisothermal and nonadiabatic tube reactors.

SE5310- Electrical Energy Distribution: (2 h/w)

- The supply system.
- Planning distribution networks.
- Technical considerations system earthing.
- Equipments.
- System protection.
- H.V. networks and substations.
- M.V. networks.
- Distribution substations and L.V. networks.

- Load data.
- Special loads.
- Network voltage performance.

SE5311- Programmable Logic Controllers (PLC) and its Applications: (2h/w)

- Input.
- Output devices.
- Input / output processing.
- Programming internal relays.
- Times – counters.
- Shift registers.
- Data handling.
- Designing programs.
- Testing and debugging.

Second Year: Second Semester

SE5401- Measurements and Control (Theory and Operation): (2 h/w)

1- Measurement of Non-electrical Quantities:

- a) Thermal measurement devices.
- b) Pressure measurement devices.
- c) Height level and consumption measurement devices.
- d) Hydrogen power measurement devices.
- e) Sub-saturation measurement devices.

2- Transmission Units:

- a) Pressure transmission units.
- b) Height level and partial pressure transmission units.
- c) Nonreversible control processes.

3- Control System:

- a) Fundamentals of feedback.
- b) Systematic control devices.
- c) Closed control devices.
- d) Open control devices.
- e) Electrical and electronic control devices.
- f) Control devices using Microprocessor.
- g) Transformation units.

4- Measurements and control Devices in industrial processes:

- a) Thermal control devices.
- b) Height level and consumption control devices.
- c) Juice processing control devices.
- d) Sugar processing control devices.
- e) Poiller controlling devices.

SE5402- Research Project: (2 h/w)

The project must be in one of Scopes of Engineering topics that deals with Sugar Industry.

SE5403- Technology of Sugar Industry (III): (4 h/w)

- 1- study of relationship between degree of sucrose solubility, temperature and pressure, definite types of different sugar solutions.
- 2- Theory of sucrose crystallization in pure and impure sugar solutions.
- 3- Sucrose crystallization by concentration of sugar solutions under vacuum.
- 4- Sucrose crystallization by cooling massecute.
- 5- Boiling system in different sugar factories.
- 6- Separation of sugar crystals from mother liquor (centrifuges), types, models- use of each centrifuge.
- 7- Sugar drying- explain theory of drying different types of dryers.
- 8- Carbonation of dry sugar, separation of crystal clumps, types and usage importance.
- 9- Weight and sugar packing, degree of accuracy of weight.
- 10- Conveyor (transport) of packing sugar and storage methods.
- 11- Design and calculation capacity of different instrument for each steps which mention previously.

Note: This Course of Unit Processes in Sugar Production (II) is to be taught to all specialties.

SE5404- Engineering Laboratory: (4 h/w)

- 1- Introduction.
- 2- Electrical power laboratory.
- 3- Electronics laboratory.
- 4- Control laboratory.

SE5405- Statistical Analysis: (2 h/w)

- 1- ***Descriptive Statistics:***
Classification of data – graphic presentation – central mean measurement – measure of variation – example using the computer.
- 2- ***Linear Regression and Correlation:***
Scattering graph – linear and nonlinear curve fitting for two groups of data function in two variables – prediction – linear

correlation coefficient (Berson) and its relation to the linear regression coefficient – meaning of linear correlation coefficient, examples using computer.

3- ***Distribution:***

Binomial – Poisson – normal distribution, properties and its use.

4- ***Estimation and Hypotheses Testing:***

Population – sample – parameter – point and interval estimation – confidence interval – difference between two means of normal distributions – confidence interval around of unit proportion, difference between two proportions – minimum and alternative hypothesis – significance level – mean hypothesis test has one difference between two means of normal distribution – unit mean hypothesis test and difference between two means – examples using computer.

Note: This Course of Statistical Analysis is to be taught to all specialties.

Elective Courses

(Second Year - Second Semester)List (A)

SE5406- Elements of Power Transmission and Mechanical Vibration:

(2h/w)

- 1- Power transmission using belts.
- 2- Power transmission using gears and gears boxes.
- 3- Sliding and rolling bearings.
- 4- Lubrication and their failures detection.
- 5- Mechanical vibrations.
- 6- Computer aided design.

SE5407- Power Stations Engineering and Economy: (2 h/w)

- 1- Energy Processing (Raw energy - Combustion - Energy cycles).
- 2- Steam Power Plants (Fuel bed firing - Suspension firing - Steam generators -Super-heaters, re-heaters, economizers, and air heaters - Condensers - Feed water heaters and evaporators - Power station pumps).
- 3- Power Economics (The general economic problem - specific economic energy problems).

SE5408- Design of Industrial Waste Treatment Systems: (2h/w)

Designed to provide the student with the fundamentals of air and water pollution problems and the control technology and legislation associated with these problems.

Elective Courses
(Second Year - Second Semester)List (B)

SE5409- System Analysis in Sugar Industry: (2 h/w)

- 1- Fundamental concepts.
- 2- Model system representation.
- 3- Relationships between model system variables.
- 4- Analytical aspects of system.
- 5- Computer solution of system.

SE5410- Variable-Speed Drives: (2 h/w)

A- D.C. Drives.

Single – phase drives – three phase drives – chopper drives closed – loop control of D.C. drives.

B- A.C. Drives:

Induction motor drives – synchronous motor drives.

C- Brushless D.C. and A.C. motor Drives

SE5411- Marketing Research: (2h/w)

Examines the principles and procedures associated with the collection and analysis of relevant information in the context of solving practical marketing problems. Students have the opportunity to apply these principles at each stage of marketing research process: Problem definition, research design, data collection, data analysis, and report preparation.

SE5412- Project Economics: (2 h/w)

- 1- An overview, the role of projects in economic development.
- 2- Economic Environment.
- 3- Determinants of project efficiency and its indicators.
 - Kinds of efficiency – industry viz project, technical viz economic.
 - Determinants of efficiency.
 - Indicators of efficiency (Productivity & Profitability).
- 4- Pricing methods in theory & practice.
- 5- Demand analysis.
- 6- Project appraisal (financial and commercial studies).
- 7- Cases.