

EVALUATION SCHEME
DIPLOMA –CHEMICAL ENGINEERING (3rd SEM)

Study And Evaluation Scheme For Diploma Chemical Engineering

SEMESTER -III

SUBJECTCODE	SUBJECTSNAME	STUDY SCHEM E Periods/Wee k			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNA L ASSESMEN T			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DFUNCCH301	Functional Communication	3	0	0	3	30	-	30	70	-	70	100
DAPPLCH302	Applied Mathematics-III	3	1	0	4	30	-	30	70	-	70	100
DCHEMCH303	Chemical Engineering Thermodynamics	3	1	0	4	30	-	30	70	-	70	100
DMATECH304	Material Energy Balance	3	1	0	4	30	-	30	70	-	70	100
DELECCH 305	Elect. Tech. & Electronics	2	1	0	3	30	-	30	70	-	70	100
DELECCH306	Elect. Tech. & Electronics Lab	0	0	2	1	-	25	25	-	25	25	50
DFUNCCH307	Functional Communication Lab	0	0	2	1	-	25	25	-	25	25	50
DCOMPCH308	Computer Application Lab	0	0	4	2	-	25	25	-	25	25	50
Total		14	4	8	22	150	75	225	350	75	425	650

***Department of Chemical Engineering
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II Year III Semester***

DFUNCCH301

FUNCTIONAL COMMUNICATION

[Common to All Diploma Engineering Courses]

L	T	P
3	0	0

Section "A" (English)

Text Lessons

Unit I.	On Communication
Unit.II	Exploring Space
Unit.III	Sir C.V. Raman
Unit.IV	Professional Development of Technicians
Unit.V	Buying a Second Hand Bicycle
Unit.VI	Leadership and Supervision
Unit.VII	First Aid
Unit.VIII	The Romanance of Reading
Unit.IX	No Escape from Computers
Unit.X	Bureau of Indian Standards

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DAPPLCH 302: APPLIED MATHEMATICS- III

1. MATRICES

- 1.1 **Algebra of Matrices, Inverse:** Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, Symmetric, Skew symmetric, Hermitian, Skew hermitian, Orthogonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix. Definition and Computation of inverse of a matrix.
- 1.2 **Elementary Row/Column Transformation:** Meaning and use in computing inverse and rank of a matrix.
- 1.3 **Linear Dependence, Rank of a Matrix:** Linear dependence/independence of vectors, Definition and computation of a rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors, Consistency of equations.
- 1.4 **Eigen Pairs, Cayley-Hamilton Theorem:** Definition and evaluation of eigen values and eigen vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof) and its verification, Use in finding inverse and powers of a matrix.

2. DIFFERENTIAL CALCULUS

- 2.1 Function of two variables, identification of surfaces in space, conicoids
- 2.2 **Partial Differentiation:** Directional derivative, Gradient, Use of gradient f , Partial Derivatives, chain rule, Higher order derivatives, Euler's theorem for homogeneous functions, Jacobians.
- 2.3 **Vector Calculus:** Vector function, Introduction to double and triple integral, differentiation and integration of vector functions, gradient, divergence and curl, differential derivatives.

3. DIFFERENTIAL EQUATION

- 3.1 **Formation, Order, Degree, Types, Solution:** Formation of differential equations through physical, geometrical, mechanical and electrical considerations, Order, Degree of a differential equation, Linear, Nonlinear equation.
- 3.2 **First Order Equations:** Variable separable, equations reducible to separable forms, Homogeneous equations, equations reducible to homogeneous forms, Linear and Bernoulli form exact equation and their solutions.
- 3.3 **Higher Order Linear Equation:** Property of solution, Linear differential equation with constant coefficients (PI for $X = e^{ax}$, $\sin ax$, $\cos ax$, X^n , $e^{ax} V$, X^m).
- 3.4 **Simple Applications:** LCR circuit, Motion under gravity, Newton's law of cooling, radioactive decay, Population growth, Force vibration of a mass point attached to spring with and without damping effect. Equivalence of electrical and mechanical system

4. INTEGRAL CALCULUS - II

- 4.1 **Beta and Gamma Functions:** Definition, Use, Relation between the two, their use in evaluating integrals.
- 4.2 **Fourier Series:** Fourier series of $f(x)$, $-n < x < n$, Odd and even function, Half range series.
- 4.3 **Laplace Transform:** Definition, Basic theorem and properties, Unit step and Periodic functions, inverse laplace transform, Solution of ordinary differential equations.

5. PROBABILITY AND STATISTICS

- 5.1 **Probability:** Introduction, Addition and Multiplication theorem and simple problem.
- 5.2 **Distribution:** Discrete and continuous distribution, Binomial Distribution, Poisson Distribution Normal Distribution.

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DCHEMCH303: CHEMICAL ENGINEERING THERMODYNAMICS

1. INTRODUCTION

Scope of Thermodynamics, open & closed system, Thermodynamic properties-Temperature, Volume, Pressure, Specific heat at constant volume, Isothermal & Adiabatic process, irreversible & reversible process, Intensive & Extensive properties.

Thermodynamic system, properties and state of a substance, processes and cycle, equality of temp. the Zeroth law of thermodynamics; the pure substance; phases of a pure substance; Phase Rule Independent properties of a pure substance; equation of state for vap or phase (Wonder Wall equation).

2. FIRST LAW: Various forms of energy; Heat work, Internal energy, Enthalpy comparison of heat and work, calculation of U, KE, PE, Q & W first law of thermodynamics for a closed system under go in a cycle; for a change in state of a closed system; Joule Thomson coefficient J; Throttling process. Calculation of U, H, Q & W for Ideal gas under going reversible isometric, Isothermal, Isobar and adiabatic processes.

- 1. SECOND LAW:** Kelvin, Planck and Clausius statement, the reversible process, Factors that render Process irreversible: the Carnot cycle, Two propositions regarding the efficiency of a Carnot cycle. thermodynamic temperature scale and ideal gas temperature scale. Thermal thermodynamic equation- Maxwell relation.
- 2. ENTROPY:** Inequality of Clausius, entropy- a property of a system, Entropy change in reversible process; Entropy change for an open system; principle of increase of entropy; efficiency, irreversibility and availability; simple numerical problem for calculation of entropy change; thermodynamic relations.
- 3. REFRIGERATIONS & LIQUEFACTION:** The Carnot refrigeration cycle, the air refrigeration cycle, vapor compression cycle, Absorption refrigeration- flow diagram and their descriptions; coefficient of performance (C.O.P). liquefaction process. Latest refrigerant and their qualities and application.
- 4. VAPOUR LIQUID EQUILIBRIA:** Concept of chemical potential, Raoult's Law, Henry's Law, Fugacity, Fugacity coefficient activity coefficient.

NOTE:- At least one Question should be asked from each topic (1 To 5).

REFERENCE BOOKS

1. Introduction to Chemical Engineering Thermodynamics by J.M. Smith
2. Chemical Engineering Thermodynamics by Pandey and Chaudhary
3. Chemical Engineering Thermodynamics by Mishra and Rastogi

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DMATECH 304: MATERIAL ENERGY BALANCE

1. **Scope of material & energy balance in process industries.**
2. (a) Dimensions, Units and their conversion factors, S.I units, mole unit, Concept of gm mole, gm atom Use of gravitational conversion factor gc.
Problems relating conversion of one set of units in a function of equation into another equivalent set for mass, length, time, temperature, area, volume, pressure, energy and force of an expression for heat capacity from one set of units to another.

(a) Density & specific gravity, mole fraction (or percent) mass fraction (or percent). conversion of the composition of a mixture from mole fraction (or percent) to mass (wt.) fraction (or percent) and reverse.

Transform a material from one measure of concentration to another, including mass/volume, moles/volume, PPM, molality, normality and molarity.
3. **THE CHEMICAL EQUATION AND STICHEOMETRY:** Definition of excess and limiting reactant, conversion, degree of completion and yield in a reaction. Relating problems. Identification of limiting and excess reactant and calculation of percent excess reactant, the percent conversion, Degree of completion of reaction, Yield for a chemical reaction with reactants being in non stoical metric proportion.
4. **BEHAVIOUR OF IDEAL GASES:** P V T relationship, standard conditions, partial pressure and pure component volume. Dolton's and Amaget's laws, average molecular weights of a gaseous mixture. Problems relating calculation of composition, average molecular weight, density and molar density, concentration of a gaseous mixture.
5. **MATERIAL BALANCE:** Tie substance, bye pass streams, recycle and purge, simple problems relating various chemical reactions and without chemical reactions.
6. **COMBUSTION PROCESS:**
 - a. Analysis of products of combustions: - Proximate and ultimate analysis.
 - b. Problems of fuel analysis, Air-fuel ratio, Theoretical oxygen/air required.
 - c. Problems on flue gas analysis.
 - d. Oxidation of sulphur and its compounds.
7. **ENERGY BALANCE:**

Forms of Energy, Definition of

 - (i) Exothermic and end other miscreation.
 - (ii) Standard heat of reaction.

- (iii) Heat of combustion.
- (iv) Heat of formation.
- (v) Heat capacity & mean heat capacity.
- (vi) Net and gross heating value (LHV & HHV).

Calculation of:

- (i) Enthalpy changes (without change of phases).
- (ii) Standard heat of reaction from heat of formation and combustion data.
- (iii) Heat of formation and combustion from combination of heat of reactions at reference temperature. (25°C).
- (iv) Heat of reaction at constant pressure or constant volume.
- (v) Heat of reaction at a temperature different from standard conditions i.e. 25°C (when reactant & products are not at 25°C).

REFERENCE BOOKS

1. Stoichiometry by B. L. Bhatt & S. M. Vora
2. Chemical Process Principles Part - I by O. A. Hougen & K. M. Watson
3. Chemical Process Principles Part - I by R. A. Rastogi
4. Solved Example in Chemical Engineering by G. K. Ray

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DELECCH305: ELECTRICAL TECHNOLOGY & ELECTRONICS

1. ELECTRIC INDUCTION:

Faraday's Laws of electromagnetic induction. Self and mutual induction. Statically and Dynamically induced e.m.f., Lenz's law. Fleming's left hand and right hand rule.

2. A. C.THEORY:

Production of alternating e.m.f. Definition of cycle, Frequency, Amplitude, Time period, Instantaneous, Average, R.M.S. maximum values of sinusoidal wave. Form factor, peak factor.

Representation of a sinusoidal quantity by a mathematical expression and phasor, phase and phase difference, Relationship of voltage and current for pure resistance, pure inductance and pure capacitive reactance, impedance. Solution and phasor diagrams of simple R.L.C. series and parallel circuits. Active and reactive power. Significance of P.F.

3. THREE PHASE CIRCUITS:

Production of Three phase voltage, advantages of three phase supply. Concept of star and delta connections. Relationship between phase and line values of currents and voltages, Power in three phase circuits, simple numerical problems.

4. MEASUREMENT& MEASURING INSTRUMENTS:

- I. Primary and secondary instruments-Indicating, Recording and Integrated instruments.
- II. Working principle and construction of the following instruments.
 - a. Ammeter & Voltmeter (Moving coil& Moving Iron).Extension of their ranges.
 - b. Dynamometer type wattmeter.
 - c. Single Phase A. C. Energy Meter.
- III. Measurement of power in a single phase and three phase circuits by wattmeter, Use of digital multimeter for measurement of voltage, Current and testing of devices.

5. ELECTRONICS:

Basic idea of semi conductors P & N type .Semiconductor diodes, Zener diodes and their applications in rectifiers. Transistors-PNP and NPN-their characteristics and uses as an amplifier (Brief description only). Principle characteristics and application of SCR. Devices like UJT, FET, DIAC, TRIAC (Brief introduction, Introduction to operational amplifier, Introduction to basic logic gates and microprocessors.

6. D. C.MACHINES:

D. C. Generator: Working principle, Constructional details, e.m.f. equation, Types of generators and their applications.

D. C. Motor: Working principle, Back e.m.f., Types of D. C. motor and elementary idea of their characteristics. Torque equation, Methods of speed control (Description Only).

7. TRANSFORMERS:

Working principle and constructional details of a single phase and 3 phase transformers, e.m.f. equation, Losses and efficiency, Cooling of transformers, Elementary idea of auto transformers and welding transformers.

8. SYNCHRONOUS MACHINES:

- a) Alternators: Working principle, Types of alternators, Constructional details, E.M.F. equation, Condition for parallel operation.
- b) Synchronous Motors: Working principle, Constructional details, Vector diagram, Effect of excitation on armature current and power factor, Synchronous condenser.

9. INDUCTION MOTORS:

- a) Three Phase Induction Motors: Working principle and constructional details-Types of induction motors-Slip ring and Squirrel cage. Slip in induction motors. Speed torque characteristic, Starting and speed control. Application of induction motors in industry. General faults and their remedies.
- b) Single Phase Induction Motors: Working principle and constructional details and application of single phase motors (Split phase, Capacitor start and Run Motor). A. C. series motors, General faults and their remedies.

10. ELECTROHEATING:

Types of electro heating. Brief description of resistance ovens and induction furnace and core furnaces.

11. ELECTROPLATING:

Importance of electroplating, Principle of electroplating and equipment used. Processes used in electroplating, Anodizing.

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DELECCH306: ELECTRICAL TECHNOLOGY & ELECTRONICS LAB

1. To change the speed and direction of rotation of d.c. shunt motor by
 - (a) Armature control method.
 - (b) Field control method.
 2. To change the speed and direction of rotation of d.c. compound motor by
 - (a) Armature control method.
 - (b) Field control method.
 3. To measure the terminal voltage with variation of load current of
 - (a) D.C. shunt generator.
 - (b) D.C. compound generator.
 4. To perform load test on a single phase transformer and determine its efficiency.
 5. To start and run a induction motor by
 - (a) Star Delta Starter.
 - (b) Auto Transformer Starter.
 6. To measure slip of an induction motor by direct loading.
 7. To start and change the direction of rotation of an induction motor.
 8. To measure transformation ratio of a single phase transformer.
 9. To measure power and P.F. in a single phase circuit by Ammeter, Voltmeter and Wattmeter.
 10. To measure power and P.F. in a 3 phase/A.C. circuit by two wattmeter method.
 11. To calibrate a single phase energy meter at different P.F.'s and different loads.
 12. To locate the faults in an electrical machine by am egger.
 13. To connect a fluorescent tube and note it's starting and running current.
 14. To draw characteristics on Silicon Controlled Rectifier(SCR).
 15. Testing of electrical devices-Zenor, Diode, Transistor, FET, UJT, SCR.
- Use of operational amplifier as adder, subtractor, comparator, differentiator and integrators.

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DFUNCCH307
FUNCTIONAL COMMUNICATION LAB

- 1. Listening** • The student should be able to listen to a text read aloud in normal speed with
- i. focus on intonation.
 - After listening the student can fill-in-blanks, choose a suitable title, make a summary, supply required information and be able to answer comprehension questions from the passage read aloud.
- 2. IMPORTANCE OF LISTENING**, Characteristics of Good and Effective Listener(Is Attentive, Do Not Assume, Listen for Feelings and Facts, Concentrate on the Other Speakers Kindly and Generously, Opportunities)
- 3. Speaking** • Reading aloud of dialogues, texts, poems, speeches focusing on intonation.
- Self-introduction • Role plays on any two-situations. • Telephonic Conversations.
- 4. NON-VERBAL COMMUNICATION-** Communication Skills
Non-Verbal Communication, We Communicate with Our Eyes, Communication with Facial Expression, A Good Gesture, Appearance, Posture and Gait, Proximity and Touch),
- 5. Communication Skills ACTIVITIES** –Activities in Making Collages, Making Advertisements, PPT Preparation & Presentation, Speaking -Seminars, Group Discussions, Debates, Extempore Speeches, Listening to an audio clip and telling its Agist, Answering a telephone call, Making enquiries, General tips- Pronunciation, Tone, Pitch, Pace, Volume, relevance, brief, simple Reading Newspaper, Magazines (Current Affairs, Economic magazines, Technical magazines), How to read a report, article, Writing- Resume Writing, Writing joining report, Notice writing, Report making, Proposal writing, Advertisement, Notice for tender, Minutes writing, E-Mail writing, Listening News, Listening to audio clips.(Lecture, poetry, speech, songs),
- 6. Body Language skills**-Introduction, What is Body Language , Body Language Parts, Personal Space Distances (Intimate Distance, Personal Distance, Social Distance, Public Distance),
- 7. IMPORTANT BODY LANGUAGE SIGNS AND THEIR MEANING**

PERSONALITY DEVELOPMENT

1 Introduction to Personality Development

AIM, Skills, Types of Skills, LIFE SKILLS VS OTHER SKILLS,

Concept of Life Skills. Ten core Life Skills identified by WHO

2. Factors Influencing / Shaping Personality :

Introduction, Physical and Social Factors Influencing / Shaping Personality (Hereditary, Self-Development, Environment, Education, Life-situations) Psychological AND Philosophical Factors Influencing / Shaping Personality (Past Experiences, Dreams and Ambitions, Self-Image, Values)

3. Self Awareness – 1

DIMENSIONS OF SELF AWARENESS (Self Realization, Self Knowledge or Self Exploration, Self Confidence, Self Talk, Self Motivation, Self Esteem, Self Image, Self Control, Self Purpose, Individuality and Uniqueness, Personality, Values, Attitude, Character), **SELF REALIZATION AND SELF EXPLORATION THROUGH SWOT ANALYSIS AND JOHARI WINDOW,**

4. Self Awareness – 2

SYMPATHY VS EMPATHY AND ALTRUISM,

Importance of Empathizing with Others.

5. Self Awareness – 3

Self-Awareness through Activity, Body Image (What is Body Image, What Decides our Body Image, What is Poor Body Image, What are the Harmful Effects of Poor Body Image), Tackling Poor Body Image(Enhance Self-Esteem, Build Up Critical Thinking, Build up Positive Qualities, Understand Cultural Variation, Dispel Myths, Utilize Life Skills)

6. Change Your Mind Set

What is Mindset, **HOW TO CHANGE YOUR MINDSET** (Get the Best Information Only, Make the best people your Role Model, Examine Your Current Beliefs, Shape Your Mindset with Vision and Goals, Find Your Voice, Protect Your Mindset, Let Go of Comparisons, Put An End To Perfectionism, Look At The Evidence, Redefine What Failure Means, Stop Worrying About What “People” Think)

7• Achieving the target

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DCOMPCH308:COMPUTER APPLICATION LAB

List of Practicals

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1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/ Report) on Word Processing tool Word and taking its print out.
3. Creating, editing, and modifying tables in Database tool.
4. Creating labels, report, and generation of simple forms in Database tool.
5. Creating simple spread sheet, using in built functions in Worksheet tool.
6. Creating simple presentation.
7. Creating mail ID, Checking mailbox, sending/reply in g- mails.
8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.