



Shri Vile Parle Kelavani Mandal's
Dwarkadas J. Sanghvi College of Engineering
(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus (DJ19)

Final Year B.Tech



In
Chemical Engineering

(Semester VII and VIII)

Revision: 1 (2019)

With effect from the Academic Year: 2022-2023

1st July, 2022





Proposed Scheme for Final Year Undergraduate Program B.Tech in Chemical Engineering : Semester VII (Autonomous)
 (Academic Year 2022-2023)

Semester VII

Sr	Course Code	Course	Teaching Scheme				Semester End Examination (A)						Continuous Assessment (B)					Aggregate (A+B)	Credits earned	
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Credits	Duration (Hrs)	Theory	Oral	Pract	Oral & Pract	SEE Total (A)	Term Test 1 (TT1)	Term Test 2 (TT2)	Avg (TT1 & TT2)	Term Work Total	CA Total (B)			
1	DJ19CHC701	Process Dynamics and Control	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19CHL701	Process Dynamics and Control Laboratory & Tutorial	--	2	--	1	2	--	--	--	25	25	--	--	--	25	25	50	1	
2	DJ19CHC702	Process Engineering	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19CHT702	Process Engineering Tutorial	--	--	1	1	1	--	--	--	--	--	--	--	25	25	25	1		
3@	DJ19CHEC7011	Nanotechnology	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	3
	DJ19CHEC7012	Heterogeneous Catalysis	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19CHEC7013	High Performance Leadership	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19CHEC7014	Food Technology	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
4@		Institute Professional Elective - 1011 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	3
		Institute Professional Elective - 1012 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1013(3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1014 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1015 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1016 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
5	DJ19CHS701	Seminar	--	--	4	2	4	--	--	--	--	--	--	--	50	50	50	2		
7	DJ19CHP701	Project-A	--	--	6	3	6	--	50	--	--	50	--	--	50	50	100	3		
		Total	12	2	11	19	25	300	50	--	25	375	100	100	100	150	250	625	19	

@ Any 1 Elective Course

Prepared by

Checked by

Head of the Department

Vice Principal

Principal



**Syllabus for Fourth Year Chemical Engineering - Semester VII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering					Semester: VII					
Course: Process Dynamics & Control					Course Code:DJ19CHC701					
Course: Process Dynamics & Control Laboratory					Course Code:DJ19CHL701					
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		50
3				2			-		4	
				--	--	25	--	25	25	

Pre-requisite: Knowledge of

1. Linear Algebra
2. Differential Equations
3. Laplace Transforms

Objectives:

1. To understand dynamic behavior of process systems and equipments.
2. To understand frequency response of dynamic systems.
3. To understand and analyze stability characteristics of dynamic systems.
4. To design controllers.

Outcomes:

1. The student will be able to model dynamical systems
2. Will be able to study their responses in Time, Laplace and Frequency domains.
3. The student will be able to design stable controllers, for important chemical processes

Detailed Syllabus: (unit wise)

Unit	Description	Duration(Hrs) 42
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1	Introduction to process control, Typical control problems, A blending process example, Control strategies, Hierarchy of Control Activities, An overview of Control System design. Selection of Controlled, Manipulated and Measured variables.	6
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2	The rationale of Dynamic Process models, General modeling Principles, Degree of Freedom Analysis, Typical Dynamic Models	6
3	Transfer Function of typical systems, First order and second order systems, Properties of Transfer Functions, Transfer function of systems in series, Time Delay Processes, Linearization of Non-linear Systems.	6
4	Dynamic behavior of Processes, Standard Process Inputs, Response of First Order Processes, Response of Second Order Processes, Response of Integrating Processes.	6
5	Basic Control Modes, Features of P, PI, PID, On-Off Control, Response of feedback control systems, Digital versions of PID Controllers.	6
6	Closed loop Transfer Functions, Closed loop response, Stability of closed loop systems, Frequency Response, Stability based on Bode Criteria, Gain and Phase Margins.	6
7	Controller Design and Tuning, Performance Criteria, On line Controller Tuning, Guidelines for common control loops, Control Strategies at the process unit level, Selection of Instrumentation, Typical Applications	6

Books Recommended:

Textbooks:

1. Dale E. Seborg, Thomas F. Edga, Duncan A. Mellichamp Francis J. Doyle; Process Dynamics and Control III; Third Edition; John Wiley & Sons (Asia) Pvt. Ltd., New Delhi – 110002

Reference Books:

1. William L. Luyben; Process Modeling Simulation and Control for Chemical Engineers; 2nd Edition; Mc-Graw Hill Publishing Co.

2. George Stephanopoulos; Chemical Process Control; PHI Learning Pvt. Ltd.

3. Sudheer S Baghade, G.D. Nageshwar, Process Dynamics and Control; PHI learning Pvt. Ltd.

4. Donald R. Coughanowr and Steven E. LeBlanc: “Process Systems Analysis and Control”, McGraw Hill, 2009

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Practical Examination:

1. A student becomes eligible for practical examination after completing a minimum of eight experiments out of the list given.
2. Practical examination: 25Marks.

List of Experiments suggested -

1	Dynamics of Single Tank System
2	Dynamics of Mercury Thermometer System
3	Non-Interacting Tank System
4	Interacting Tank System
5	Manometer
6	Flow Trainer
7	Study of various elements of control system
8	Study of various Instruments
9	Study of Various control configurations
10	Study of Pneumatic and Electronic controllers

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

**Syllabus for Fourth Year Chemical Engineering - Semester VII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering				Semester : VII					
Course : Process Engineering				Course Code:DJ19CHC702					
Course : Process Engineering Tutorial				Course Code: DJ19CHT702					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	-	1	3	--	--	--	--	25	25
									25

Pre-requisite:

- DJ19CHC304 Material and Energy Balance Calculation
- DJCHC305 Fluid Flow
- DJ19CHC404 Chemical Engineering Thermodynamics II
- DJ19CHC602 Mass Transfer Operation II

Objectives:

- Assess and arrive at a suitable Chemical Process for given product.
- Propose Process Block Diagram and Process Flow Diagram for a selected Process
- Do Process Design of Heat Exchanger, Reactor.
- Do a Process Design of Distillation Column
- Do Short Cut Calculation for Chemical Equipments

Outcomes:

After completion of the course, students will be able to:

- The student should be able to select the relevant Chemical Process for the economic and technological condition of the country
- The student should be able to evolve a Process Flow diagram for a chemical process by doing a research on the pathways to the selected compound.
- The student should be able to size the chemical equipment after solve the process flow sheet for mass and energy.
- The student should be aware of Process Simulator.

Detailed Syllabus: (unit wise)		
Unit	Description	Duration(Hrs)
1	Introduction to Process Engineering Chemical Products, Formulation of the Design Problem, Chemical Process Design and Integration, The Hierarchy of Chemical Process, Design and Integration, Continuous and Batch Processes, New Design and Retrofit, Approaches to Chemical Process Design and Integration, Process Control, Basic concepts regarding PFD, Block diagrams, P and ID Process flow diagram, piping and instrumentation diagram, Importance of safety and environmental aspects.	05
2	Process Design of Piping, Fluid moving Devices and Flow Meters (with numerical). Process design of piping, process design of fluid moving devices, Centrifugal pump performance for viscous fluids, Revision of formulae for power requirement for fans, blowers, adiabatic compressor. Calculation of pressure drop for piping networks.	08
3	Process Design of Distillation Column Selection criteria, equipment selection, distillation column design (multicomponent with numerical), FUG, Thiele Geddes method, Selection of tray, process design of tray tower, height of packings. Introduction to Chemsep for Distillation Column Simulation. Process Control of Distillation Columns.	08
4	Process Design of Absorbers Selection criteria, design of absorber and stripper (with numerical) using Absorption Factor Method	04
5	Reactors: Mass and Energy Balance for reactor, Choice of reactors-Reactor Configuration (Temperature Control, Catalyst Degradation, Gas-Liquid and Liquid-Liquid Reactors, Reactor Configuration, Reactor Configuration for Heterogeneous Solid-Catalyzed Reactions, Process Control Strategy for Batch Reactor.	08
6	Sizing/Costing of Equipments in Flow Sheet: Distillation columns absorbers, pumps, compressors, heat exchangers (with numerical)	06
7	Role and responsibilities: Role and responsibility of process and chemical engineering profession towards society, environment, ethical aspects, safety	03

Books Recommended:

Textbooks:

1. Smith, R.; Chemical Process Design and Integration; Wiley, 2006;

Reference Books:

1. Thakore S.B, Bhatt B.I; Introduction to Process Engineering and Design; McGraw Hill Education, 2e.
2. Seider W.D., Seader J.D. Lewin D.R., Widago S.; Product and Process Design Principles: Synthesis, Analysis and Evaluation, Wiley, 3e.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.



2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.



Prepared by

Checked by

Head of the Department

Principal



Syllabus for Fourth Year Chemical Engineering - Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Fourth Year Chemical Engineering					Semester : VII					
Course : Nanotechnology					Course Code: DJ19CHEC7011					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)	
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	100
				75			25	25	25	
				Laboratory Examination			Term work		Total Term work	--
3	-	-	3	Oral	Practical	Oral & Practical	Laborator y Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--		

Pre-requisite:

Basic concepts of: electron, atom, ions, molecules & molecular rearrangements; fluid flow; thermodynamics; heat transfer; materials and metals.

Objectives:

The students completing this course are expected to understand:

1. The basic scientific concepts in nanoscience and nanotechnology.
2. The properties of materials and biomaterials at the atomic/molecular level and the scaling laws governing these properties.
3. How to apply skills from another relevant area of engineering or science and technology to the study of nanotechnology.
4. What nanotechnology is about and how to use it.

Outcomes:

After completion of the course, students will be able to:

1. Understand the essential concepts used in nanotechnology.
2. Gain knowledge of fabrication and characterization methods in nanotechnology.
3. Gain knowledge of structure, properties, applications, and preparation techniques of nano-scale materials like Fullerenes and Carbon Nano Tubes.
4. Gain knowledge about importance and applications of nanotechnology in the field of biology, medicines.

Detailed Syllabus: (unit wise)

Unit	Description	Duration (Hrs.)
1	Fundamentals of Science behind Nanotechnology: Electron, Atom and Ions, Molecules, Metals, Bio systems, Molecular Recognition, Electrical Conduction and Ohms Law, Quantum Mechanics and Quantum Ideas, Optics.	05

2	<p>Nanostructuring Methods: Vacuum Synthesis, Gas Evaporation Tech, Condensed Phase Synthesis, Sol Gel Processing, Polymer Thin Film, Atomic Lithography, Electro deposition, Plasma Compaction.</p> <p>Characterization of Nanostructures: Transmission Electron Microscope, Scanning Electron Microscope, Microwave Spectroscopy, Raman Microscopy, X ray Diffraction.</p>	13
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3	<p>Fullerenes: Combustion Flame Electric Synthesis, Crystal Formation, Sintering, Organic Synthesis Method, Super Critical Oligomerization, Solar Process, Electric Arc Process.</p> <p>Carbon Nano Tubes (CNT): Synthesis of CNT, Electric Arc Discharge Process, Laser Ablation Process, CVD, HIPCO Process, Surface Mediated growth of Vertically Aligned Tubes, Physical Properties, Morphology and Applications of CNTs.</p> <p>Introduction to Nanomaterials from sources other than carbon based materials: Aluminum oxide, Gold, Silver, Copper, Cobalt oxide, Platinum, Titanium dioxide.</p>	16
4	<p>Nanobiology: Interaction between Biomolecules & Nanoparticle Surface, Influence of Electrostatic Interactions in the binding of Proteins with Nanoparticles, The Electronic effects of biomolecule-nanoparticle interaction, Different Types of Inorganic materials used for the synthesis of Hybrid Nano-bio assemblies, Application.</p>	08

Books Recommended:

Textbooks:

1. Nanotechnology: A Gentle Introduction to the Next Big Idea-By Mark Ratner, Daniel Ratner
2. Introduction to Nanotechnology- Charles P. Poole, Jr. and Frank J. Owens, John Wiley & Sons, 2003
3. Nano-The Essentials, Understanding Nanoscience and Nanotechnology, T. Pradeep
4. Nano-structuring Operations in Nanoscale Science and Engineering- Kal Ranganathan Sharma, McGraw-Hill Companies
5. Nanotechnology: Basic and Emerging technologies, Michael Wilson, Chapman & Hall

Reference Books:

1. Nanotechnology: Basic Calculations for Engineers and Scientists - Louis Theodore, A John Willy & Sons
2. Nanotechnology Assessment and Prospective - Schmid et al., Springer
3. Principal of Nanotechnology-Molecular Based Study of Condensed Matter in Small Systems - G. Ali Mansoori
4. Nano Materials- B. Viswanathan

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

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Syllabus for Third Year Chemical Engineering - Semester V (Autonomous)
(Academic Year 2022-2023)

Program: Final Year Chemical Engineering					Semester : VII					
Course : Heterogeneous Catalysis					Course Code: DJ19CHEC7012					
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	
				Laboratory Examination			Term work		Total Term work	--
3	0	0	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Pre-requisite:

- Advanced chemistry
- Engineering Mathematics
- Chemical Reaction Engineering-I

Objectives:

- Development of Kinetic model for Heterogeneous reactions giving emphasis on catalytic reactions in isothermal, adiabatic or non-isothermal conditions.
- Development of design strategy for Heterogeneous reactions considering different types of reactors for example fixed bed tubular reactor, fluidized bed reactor, packed bed reactors etc. Reactor design for reactions operating under isothermal, adiabatic or non-isothermal conditions.

Outcomes:

After completion of the course, students will be able to:

- To apply the knowledge they have gained to find the model equation and use this model to design the reactors used for heterogeneous reactions taking place in isothermal or non-isothermal conditions.

Detailed Syllabus: (unit wise)		
Unit	Description	Duration(42 Hrs)
1	Testing of catalysts, various types of reactors, activity and selectivity studies. Effect of external transport processes on observed rate of reactions. Effect of Internal transport processes: reactions and diffusion in porous catalysts.	10
2	Catalysts Characterization methods: Surface area and pore volume determinations, XRD various Spectroscopic techniques, Temperature programmed reduction & oxidation Electron microscopy	12
3	Photocatalysis: INTRODUCTION,FUNDAMENTALS OF PHOTOCATALYSIS, PHOTOINACTIVATION, Photocatalytic Oxidation, Anti-Bacterial Effect, Deodorizing Effect and other applicable effects	10
4	Catalyst Design: Design of heterogeneous catalyst	05
5	New development in solid catalysis, monolith catalysts, nanocatalysts, Fuel cell catalysts, Environmental catalysts, Insitu characterization.	05

Books Recommended:

Textbooks:

- G. Ertl, H. Knozinger and J. Weitkamp, "Handbook of Heterogeneous Catalysis" Vol. 1-5, Wiley - VCH.
- J. M. Smith, "Chemical Engineering Kinetics", McGraw-Hill Book Company.
- J. M. Thomas and W. J. Thomas, "Principles and Practice of Heterogeneous Catalysis", Wiley-VCH.
- H. S. Fogler, "Elements of Chemical Reaction Engineering", Prentice - Hall of India.
- Handbook of Heterogeneous Catalysis by B C GATES

Reference Books:

- C. H. Bartholomew and R. J. Farrauto, "Fundamentals of Industrial Catalytic Processes", Wiley- VCH.
- Hill C.G., Chemical Reaction Engineering.
- J.J. Carberry, "Chemical and Catalytic Reaction Engineering", Dover Publications.
- B. Viswanathan, S. Sivasanker, A.V. Ramaswamy, "Catalysis: Principles and

Applications", CRC Press.



Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

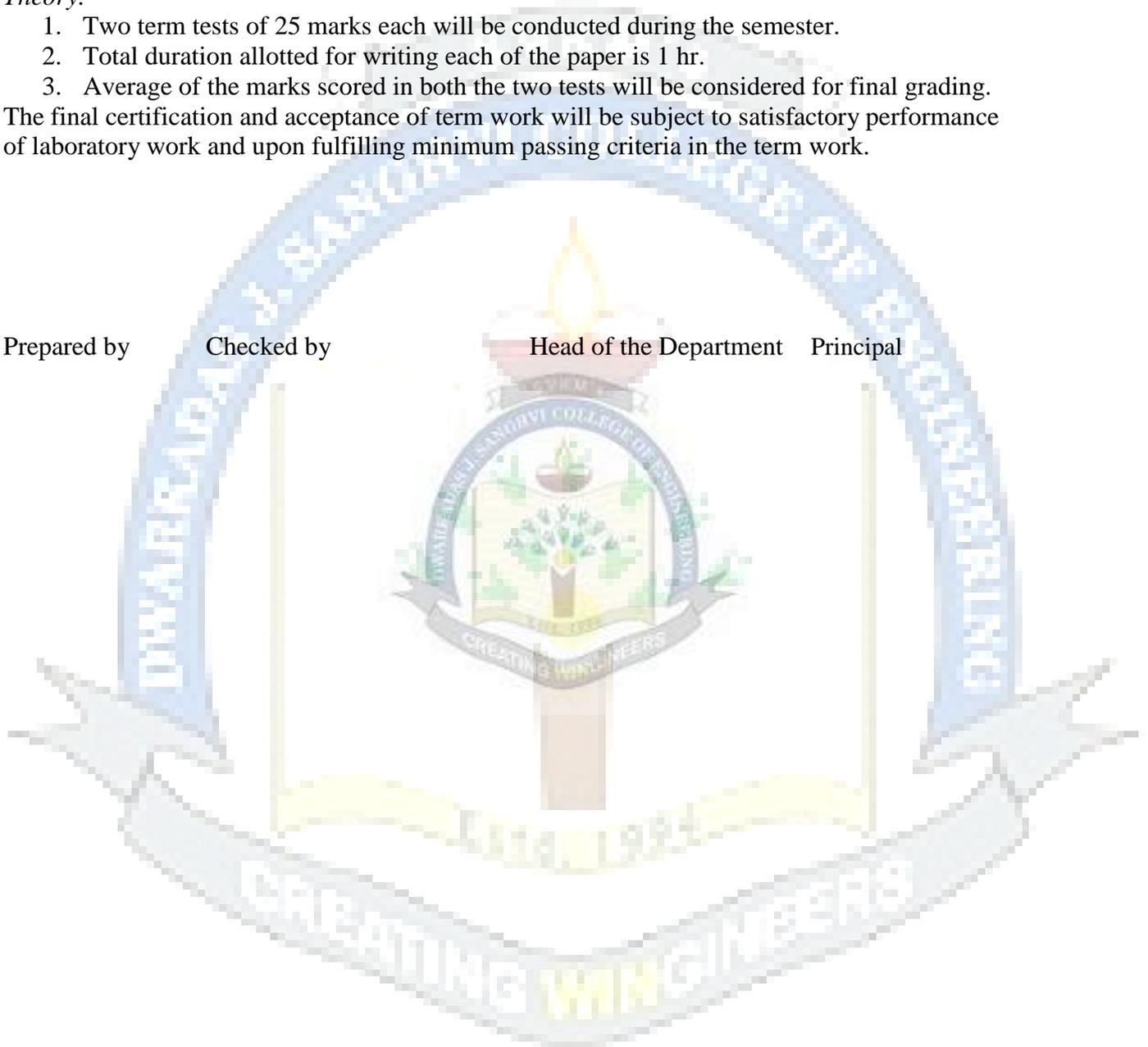
The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Prepared by

Checked by

Head of the Department

Principal



**Syllabus for Final Year Chemical Engineering - Semester VII (Autonomous)
(Academic Year 2022-2023)**

Program: Final Year Chemical Engineering					Semester : VII					
Course : Department Elective III- High Performance Leadership					Course Code: DJ19CHEC7013					
Teaching Scheme (Hours / week)				Evaluation Scheme						Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	100
				75			25	25	25	
				Laboratory Examination			Term work		Total Term work	--
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
3	--	--	3	--	--	--	--	--	--	--

Pre-requisite: NIL

Objectives:

- To become aware of strengths and weaknesses in one's leadership behaviour.
- Analyze the numerous approaches of leadership development and critically evaluate how they may be applied in practice.
- To understand how the most successful leaders are able to influence followers through effective communication of well-reasoned ideas, proposals and values.
- To systematically train and improve one's leadership effectiveness.

Outcomes:

At the end of the course the student will be able to: -

- Improve one's self leadership skills through effective emotion regulation and emotional intelligence.
- Apply concepts of leadership and effective communication to individuals, groups, and organizations

Detailed Syllabus: (unit wise)		
Unit	Description	Durat ion (Hrs)
1	Leadership: Theories of Leadership, Leadership Styles and Leadership, Leadership Skills, Objectives for personal development.	06
2	Leadership Skills: Leadership Skills and Leadership, Developing competencies, The Business Related Inventory of Personality (strengths and weaknesses), Changing behaviour in critical situations.	06

3	Team work & Positive thinking: Team work & Team building, Positive thinking Martin Seligman's theory of Learned, Helplessness, Learned Optimism Lessons through Literature, Positive thinking, Attitudes, Beliefs, Lateral Thinking.	07
4	Interpersonal skills: Interpersonal skills, Conversation, Feedback, Feed forward, Transformational Leadership: analysis and consequences from the 360° feedback, Interpersonal skills, Delegation, Humor, Trust, Expectations, Values, Status, Compatibility.	08
5	Effective Leadership Communication: Principles of effective communication: authenticity, clarity, credibility, and empathy. Persuasion including body language, posture, facial expressions, gestures, creating a personal relationship (message-audience-speaker), Impact speech: effective and convincing lines of argument.	08
6	Conflict Management: Types of conflict, Coping strategies and Conflict management styles, Creative problem solving techniques.	07

Books Recommended:

Textbooks:

1. Jeff Grimshaw & Gregg Baron, Leadership without Excuses: How to Create Account ability and High-Performance, Tata McGraw - Hill Education, 1st Ed., 2010.
2. Harrison Owen, Wave Rider: Leadership for High Performance in a Self-organizing World, Berrett-Koehler Publishers, 2008.

Reference Books:

1. Daniel Goleman, Richard E. Boyatzis, Annie McKee, Primal Leadership: Realizing the Power of Emotional Intelligence, Harvard Business Review Press, 2002.
2. John Baldoni, Great Communication Secrets of Great Leaders, Primento Digital Publication, 2012.
3. Paul Glen, Leading Geeks: How to Manage and Lead the People Who Deliver Technology, Wiley Publication, 2002.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Prepared by

Checked by

Head of the Department

Principal



**Syllabus for Fourth Year Chemical Engineering - Semester VII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering					Semester : VIII				
Course : Food Technology					Course Code: DJ19CHEC7014				
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lecture s	Practic al	Tutoria l	Total Credit s	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Tota l Ter m work
				Oral	Practic al	Oral & Practi cal	Laborato ry Work	Tutorial / Mini project / presentatio n/ Journal	
3	-	-	3	--	--	-	--	-	-

Pre-requisite: Knowledge of Microbiology, Biochemistry, chemical engineering

Objectives: To impart knowledge to the students about food processing and various unit operations involved in it, packaging, storing and preservation, food adulteration, food related hazards and safety.

Outcomes:

After completion of the course, students will be able to:

1. Understand knowledge of food essential nutrients and the various causes of food deterioration.
2. Identification of appropriate processing, preservation, and packaging method.
3. Students should be able to analyze product quality and effect of processing technique on it.
4. They should Identify important species of pathogenic microbes and describe factors that affect their growth in various types of food.
5. Analysis of food related hazards and HACCP method

Detailed Syllabus: (unit wise)		
Unit	Description	Durati on(Hr s) 42
1	Nutritional & sensory characteristics, Food fortification. Water activity enzymes: Production from microorganisms and application in food processing, Growth of microorganisms and food spoilage, D & Z values, Indian laws regulating Foods and Foods processing	4
2	Ambient Temperature Process: Raw material preparation, Size reduction of solid fibrous foods and in liquid foods., Emulsification and Homogenization , Fermentation : Theory , Types, Effect on foods	8
3	Thermal Processing: (Theory, Effect on foods) blanching, pasteurization, Heat Sterilization, In- container Ultra high temperature (UHT)/aseptic processes, Microbial spoilage, thermal death time curve.	8
4	Freezing and Refrigeration: effects of low temperature on quality, chilling, freezing, freeze drying and freeze concentration.	8
5	Food Storage & Packaging: Modified Atmosphere Storage (MAS), Hurdle Technology, Modified atmosphere packaging (MAP) Food Adulteration & Quality Management: Food Adulteration and food safety. HACCP, GMP, GHP, GLP.	6
6	Food Processing: Manufacturing and processing of food products: Fruit juice processing, Milk and Milk Products; Milk powder, cheese, Tea, Bread, confectionary(hard boiled sweets & chocolates)	8

Books Recommended:

Textbooks:

1. Fellows, P., Food Processing Technology: Principles and Practice, 2nd ed., Woodhead Publishing Ltd., England, 2000

Reference Books:

1. Toledo, R., Fundamentals of Food Process Engineering, 2nd ed., CBS Publishers & Distributors, New Delhi, 1997.
2. Sharma K., et.al., Food Process Engineering, Theory and Laboratory Experiments, John Wiley and Sons Inc., Canada 2000.
2. Pandey and Srivastava, Chemical Process Technology, Vol.2
3. Singh, R.P. & Heldman, D.R., Introduction to Food Engineering, 3rd ed., Academic press, UK 2001.
4. Lelieveld, H.L.M., et.al. Hygiene in Food Processing, Woodhead Publ. Ltd., England 2003.
5. Subbulakshmi G. & Udipi S.A., Food Processing and Preservation, New Age International Pvt. Ltd., India 2001.
6. Valentas, k.J.et.al., Food Processing Operations and scale up, Marcel Dekker, N.Y 1991.
7. Tamb, I.A. and Singh R.P., Food Storage Stability CRC Press 19981
8. D. G. Rao, Fundamentals of Food Engineering, PHI Learning Pvt. Ltd.

Evaluation Scheme:

Semester End Examination (A):

Theory:

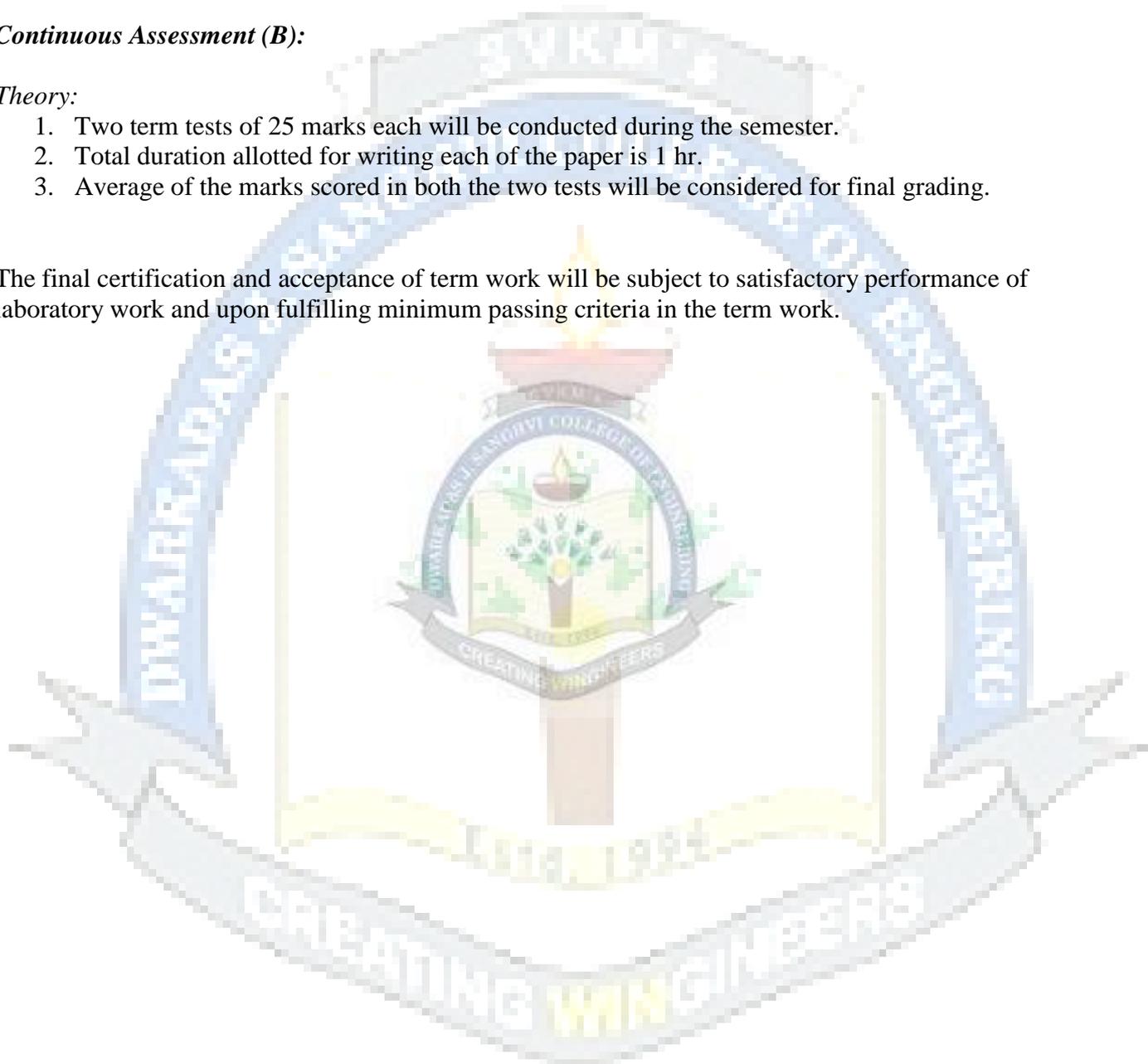
1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.



**Syllabus for Fourth Year Chemical Engineering - Semester VII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering				Semester : VII					
Course : Seminar				Course Code: DJ19CHS701					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				--	--	--	--	--	--
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laborat ory Work	Tutorial / Mini project / presentation/ Journal	
-	-	4	2	--	--	--	--	50	50

Details

Seminar topics will be the consensus of the project guide and the students. Each student will work on a unique topic.

The load for seminar will be calculated as one hour per week irrespective of the number of students.

The final certification and acceptance of term work will be subject to fulfilling minimum passing criteria in the term work.

Prepared by

Checked by

Head of the Department

Principal

Syllabus for Fourth Year Chemical Engineering - Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Fourth Year Chemical Engineering				Semester : VII						
Course : Project-A				Course Code: DJ19CHP701						
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				--			--	--	--	--
				Laboratory Examination			Term work		Total Term work	100
				Oral	Practical	Oral & Practical	Laborat ory Work	Tutorial / Mini project / presentation/ Journal		
				50	--	--	--	50	50	

Details

- Project Groups: Students can form groups with not more than 3(Three).
- Students should spend considerable time in applying all the concepts studied, into the project. Hence, six hours each are allotted in Project to the students.
- Students are advised to take up industrial/ experimental oriented/ simulation and/or optimization based topics for their projects.

The final certification and acceptance of term work will be subject to fulfilling minimum passing criteria in the term work.

Prepared by

Checked by

Head of the Department

Principal



Proposed Scheme for Final Year Undergraduate Program B.Tech in Chemical Engineering : Semester VIII (Autonomous) (Academic Year 2022-2023)

Semester VIII

Sr	Course Code	Course	Teaching Scheme				Semester End Examination (A)					Continuous Assessment (B)					Aggregate (A+B)	Credits earned		
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Credits	Duration (Hrs)	Theory	Oral	Pract	Oral & Pract	SEE Total (A)	Term Test 1 (TT1)	Term Test 2 (TT2)	Avg (TT1 & TT2)	Term Work Total			CA Total (B)	
1	DJ19CHC801	Modelling and Simulation	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19CHL801	Modelling and Simulation Laboratory	--	2	--	1	2	--	--	--	25	25	--	--	--	25	25	50	1	
2	DJ19CHC802	Environmental Engineering	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19CHL802	Environmental Engineering Laboratory	--	2	--	1	2	--	--	--	25	25	--	--	--	25	25	50	1	
3@	DJ19CHEC8011	Petroleum Refining and Technology	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	3
	DJ19CHEC8012	Advanced Separation Processes	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19CHEC8013	Project Engineering and Entrepreneurship Management	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19CHEC8014	Instrumentation	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
4@		Institute Professional Elective - 1021 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	3
		Institute Professional Elective - 1022 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1023 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1024 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1025 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
		Institute Professional Elective - 1026 (3 Credits)	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
6	DJ19CHP801	Project Stage-II	--	10	--	5	--	--	--	100	100	--	--	--	100	100	200	5		
		Total	12	14	--	19	16	300	--	--	150	450	100	100	100	150	250	700	19	

@ Any 1 Elective Course

Prepared by

Checked by

Head of the Department

Vice Principal

Principal

**Syllabus for Fourth Year Chemical Engineering - Semester VIII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering				Semester : VIII					
Course : Modelling and Simulation				Course Code:DJ19CHC801					
Course : Modelling and Simulation Laboratory				Course Code:DJ19CHL801					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
3	2	-	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
				--	--	25	--	25	25

Pre-requisite:

DJ19CHC304 M & EBC
 DJ19CHC404 CET-II
 DJ19CHC501 CRE-I
 DJ19CHC503 HTO
 DJ19CHC601 CRE-II
 DJ19CHC602 MTO-II
 DJ19CHC604 CPNM
 DJ19CHC702 PE

Objectives:

- To make students understand writing and solving models of chemical engineering systems.
- To make students understand writing and solving systems of nonlinear equations for single and multiple units
- To make students understand simulation of complete flowsheets.

Outcomes:

After completion of the course, students will be able to:

- Form and solve linear models for Major Unit Operations and Unit Processes.
- Form and solve nonlinear models for few Unit Operations.
- Carry out sequential and equation-oriented simulation of complete flowsheets.

Detailed Syllabus: (unit wise)		
Unit	Description	Durati on(Hrs)
1	Modelling Aspects: Definition of process model, physical and mathematical modelling, classification of models, model building, classification of mathematical methods, uses of mathematical models, scope of coverage, principles of formulation, fundamental laws, continuity equations, energy equations, equation of motion, transport equation, equation of state, equilibrium, kinetics.	08
2	Mathematical Models of Chemical Engineering Systems: Thermodynamic Options for process simulation, Multicomponent Flash Calculations (linear and nonlinear) , Multicomponent Absorption, Multicomponent distillation	10
3	Mathematical models for Reactors: - CSTR in series with variable holds up, two heated tanks, gas-phase, pressurized CSTR, non-isothermal CSTR, single-component vaporizer, and reactor with mass transfer, Degree of Freedom analysis Concept of design and rating problem in context of selection variables after DOF analysis.	08
4	Introduction to Simulation: - Sequential and Equation oriented Simulation, Flowsheet topology analysis, Recycle, Partitioning and Tearing of flow sheets. Simulation Examples, Williams Otto Flow sheeting.	08
5	Numerical Methods for solving sets of nonlinear equations, Newton's method with Armijo Line search, Successive substitution. Solution for models developed in module 2 and 3	08

Books Recommended:

Textbooks:

1. Lorenz T. Biegler, Ignacio E. Grossman, Arthur W. Westerburg, Systematic Methods of Chemical Process Design, Prentice Hall
2. William Y. Luyben, Process Modelling simulation and control for chemical Engineer, Second edition McGraw Hill
3. Davis, Mark E. Numerical methods and modeling for chemical engineers, (1984) John Wiley & Sons , New York.

Reference Books:

1. Thomas Edgar, David M. Himmelbleau, Optimization of Chemical Processes, 2nd Ed., John Wiley.
2. A. W. Westerberg, H. P. Hutchison, R. L. Motard, P. Winter, Process Flow sheeting, Cambridge University Press; 1 edition (June 9, 2011).
3. James B. Riggs, An Introduction to Numerical Methods for Chemical Engineers, 2nd edition, Texas Tech Univ Pr; Subsequent edition (1 July 1994)

Evaluation Scheme:**Semester End Examination (A):***Theory:*

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Practical Examination:

1. A student becomes eligible for practical examination after completing a minimum of eight experiments out of the list given.
2. Practical examination: 25Marks.

List of Experiments suggested -

1	Nonlinear Binary VLE
2	Multicomponent linear VLE
3	Multicomponent non ideal VLE
4	Multicomponent Flash
5	P- Q Flash
6	Multi component absorption
7	Multicomponent Distillation
8	Jacket Temperature Simulation.
9	Simulation of conical storage tank.
10	Simulation of Three CSTRs in Series
11	Simulation of Series reaction in batch reactor.

Continuous Assessment (B):*Theory:*

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

**Syllabus for Fourth Year Chemical Engineering - Semester VIII (Autonomous)
(Academic Year 2022-2023)**

Program: Forth Year Chemical Engineering					Semester : VIII				
Course : : Environmental Engineering					Course Code: DJ19CHC802				
Course : : Environmental Engineering Laboratory					Course Code: DJ19CHCL802				
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lecture s	Practic al	Tutoria l	Total Credit s	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practic al	Oral & Practi cal	Laborato ry Work	Tutorial / Mini project / presentation/ Journal	
				--	--	25	--	25	25
3	2	-	4						50

Pre-requisite:

Basic concepts of Fluid Flow Operations, Solid Fluid Mechanical Operations, Mass Transfer Operations and Chemical Reaction Engineering.

Course Objectives:

1. Students should be able to understand the scope of subjects in Chemical Industry.
2. Students should learn to apply the Environmental Engineering concepts to control management of various types of pollutants

Course Outcomes: After completion of the course, students will be able to:

1. To understand Importance of environmental pollution, such as air, water, solid, noise. Various pollutants sources, adverse effects, Environmental Legislation
2. To understand meteorological aspects air pollutant dispersion. Sampling and measurement, Control Methods and Equipment:
3. To understand Sampling, measurement of various water pollutants.
4. To understand and design various Waste Water Treatments.

Detailed Syllabus: (unit wise)		
Unit	Description	Duration(Hrs) 42
1	Water Pollution: Classification of sources and effect of water pollutant on human being and ecology, Sampling, measurement and standards of water quality, Determination of organic matters: DO, BOD, COD, and TOC. Determination of inorganic substances: nitrogen, phosphorus, trace elements, alkalinity. Physical characteristics: suspended solids, dissolved solids, colour and odour, Bacteriological measurements.	8
2	Waste Water Treatment: Primary treatment: pre-treatment, settling tanks and their sizing. Secondary treatment: micro-organisms growth kinetics, aerobic biological treatment, activated sludge process, evaluation of bioKinetic parameters, trickling filters, sludge treatment and disposal. Tertiary treatment: advanced methods for removal of nutrients, suspended and dissolved solids, Advanced biological systems, Chemical oxidation, Recovery of materials from process effluents.	14
3	Air Pollution Air pollutants, sources and effect on man and environment, behaviour and fate of air pollutants, photochemical smog, Meteorological aspects of Air pollutants: Temperature lapse rate and stability, inversion, wind velocity and turbulence, Plume behaviour, Dispersion of air pollutants, Gaussian plume model, Estimation of plume rise, Air pollution sampling and measurement, Analysis of air pollutants	12
4	Air Pollution Control Methods: Source correction methods for air pollution control, Cleaning of gaseous effluents, Particulate emission control, collection efficiency	7
5	Noise Pollution: Noise pollution: measurement and control, effect on man and environment.	1

Books Recommended:

Textbooks:

1. Rao, C.S., Environmental Pollution Control Engineering, New Age International (P) Ltd.

Reference Books:

1. Peavy, H. S., Rowe, D.R., Tchobanoglous, G., Environmental Engineering, McGraw-Hill Book Company Limited
2. Metcalf et al., Waste Water Treatment, Disposal & Reuse, Tata McGraw Hill Publishing Company Limited.
3. Mahajan, S.P., Pollution Control in Process Industries, Tata McGraw Hill Publishing Company Limited

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Practical Examination:

1. A student becomes eligible for practical examination after completing a minimum of eight experiments out of the list given.
2. Practical examination: 25Marks.

List of Experiments suggested -

1.	Physical characterization (TDS /turbidity measurement) of waste water.
2.	Chemical characterization (chloride ion, sulphate ion etc.) of waste water
3.	Determination of dissolved oxygen in waste water.
4.	Sampling measurement and standard of water quality (determination of BOD)
5.	Sampling measurement and standard of water quality (determination of COD)
6.	Determination of toxic matters phenol in waste water.
7.	Determination of toxic heavy metal like chromium in waste water.
8.	Estimation of sodium by flame photometry
9.	Measurement of gaseous pollutant (any one) in air. CO,CO ₂ , H ₂ S
10.	Measurement of sound level.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

**Syllabus for Fourth Year Chemical Engineering - Semester VIII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering					Semester : VIII					
Course : Petroleum Refining and Technology (Department Elective)					Course Code:DJ19CHEC8011					
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	
				Oral	Practical	Oral & Practical	Laborator y Work	Tutorial / Mini project / presentation/ Journal		
3	-	-	3	--	--	-	--	25	25	

Pre-requisite:

- Knowledge about Formation & Origin of petroleum, Composition & testing methods & Basic treatment techniques.

Objectives:

1. To understand Petroleum Refining processes & products, its evaluation & treatment techniques
2. To understand various cracking processes & its applications in Chemical industries.

Outcomes:

After completion of the course, students will be able to:

1. Characterize crude petroleum and petroleum refinery
2. Fractionate crude petroleum into useful fractions
3. Measure important physical properties of petroleum products
4. Apply refinery processes to maximize desired petro products
5. Use treatment techniques to purify petro products
6. Knowledge about Bio –Refinery & alternate source of energy

Detailed Syllabus: (unit wise)		
Unit	Description	Durati on(Hrs) 42
1	Introduction -Origin ,Formation & Composition of Petroleum: Importance, Origin theory, Reserves in India & world. Exploration of Reserves, Types of crude, (Based on constituents, Sulfur contents & Degree API). Indian crude reserves & production scenario, Indian Petroleum Industry Scenario, Agencies engaged in upstream & downstream petroleum industry (Government & Private).	6
2	Crude Oil Assay: Properties, composition, UOP Characterization factors, Correlation index, Crude distillation curves. Important products test & methods, Gasoline, Kerosene, Diesel	6
3	Crude Oil Processing & Refining: Separation of well fluid, Dehydration & desalting of crude, Overall refinery flow diagram, its processes & Products, Low boiling products –LPG, Gasoline, Kerosene & their Specifications. Multi component fractionation of petroleum including pump around & side stripping, ADU & VDU, Multi component fractionation of petroleum including pump around & pump back calculations, Material balance & flash zone calculations, with numerical. Blending of gasoline, Corrosion problem.	10
4	Catalytic Cracking & Thermal Processes: Fluidized bed catalytic cracking, Catalytic reforming, Coking, Hydrogen Processes- Hydro cracking & Hydrodesulphurization, Alkylation Process, Isomerization process, Polymer gasoline Treatment ,Techniques & Product Specifications: Treatment of Gasoline, Kerosene, Lubes & Wax	12
5	Asphalt Technology & Environmental issues: Source of Asphalt, Air blowing of Bitumen, , Environmental issues in Petroleum industry, Alternative energy sources Introduction to the basic concept of ‘The refinery of the future’. Bio refinery & Biofuels. (Bio Diesel, Heavy Oil, Shale Oil, Methane Hydrate etc.).	8

Books Recommended:

Textbooks:

1. B.K Bhaskara Rao, Modern Petroleum Refining Process

Reference Books:

References

1. Petroleum Refining, Technology & Economics 4th edition James H. Garry and Glenn Handwerk
2. W.L Nelson, Petroleum Refinery Engineering 4th ed, McGraw Hill.
3. Petroleum Chemistry and Refining Edited by James G. Speight, Taylor and Francies .
4. Chemical Process Industries, Austin, G.T Shreves.

Evaluation Scheme:**Semester End Examination (A):***Theory:*

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):*Theory:*

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



**Syllabus for Fourth Year Chemical Engineering - Semester VIII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering					Semester : VIII					
Course : Advanced Separation Processes					Course Code: DJ19CHEC8012					
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	
				Oral	Practical	Oral & Practical	Laborat ory Work	Tutorial / Mini project / presentation/ Journal		
3	-	-	3	--	--	--	--	--	--	

Pre-requisite:

Basic knowledge regarding fundamental separation processes and applications in chemical Industries.

Objectives:

The students completing this course are expected to understand:

1. The various separation principles like adsorption process, the types and designs.
2. The supercritical extraction and modern distillation process.
3. Introduction to foam fractionation process and application in waste water treatment.
4. Liquid chromatography – types and separation of enzymes using it.
5. Membrane processes- Types of membranes, characterization of membranes, membrane modules.

Outcomes:

After completion of the course, students will be able to:

1. Learn various adsorption processes and designs.
2. Learn supercritical extraction and modern distillation process.
3. Learn foam fractionation process and typical applications.
4. Learn liquid chromatographic processes with applications.
5. Learn membrane processes, characterization of membranes and membrane modules.

Detailed Syllabus: (unit wise)

Unit	Description	Duration (Hrs)
1	Adsorption Process: Adsorbent such as activated carbon, molecular sieves of various types, activated alumina. Their characteristics and applications. Regeneration & Activation of adsorbents. Thermal & pressure swing process. Fixed bed, moving bed, stimulated moving bed and other processing schemes. Design of adsorption process for separation and purification. Industrial examples and related numericals.	08

2	Super critical extraction and advanced distillation techniques: Working principle, advantages and disadvantages of supercritical solvents over conventional liquid solvents, advantages and disadvantages of supercritical extraction over liquid-liquid extraction. Commercial applications of supercritical extraction. The concept of advanced distillation techniques, advantages and disadvantages and comparison with conventional techniques.	08
3	Foam Fractionation Process: Foam Formation, coalescence, collapse and drainage phenomena. Adsorption properties of foams. Principle of froth flotation. Application of froth flotation in industries and waste water treatment.	08
4	Liquid Chromatographic Process: Basic concept of chromatography phenomena and characterization. Various chromatography options. Typical chromatographic separation systems for preparative chromatography. Applications of chromatography in enzymes and other Industrial separations.	08
5	Membrane process: Introduction to the membrane process, definition of membrane, importance, process. Characterization of membranes: Characterization of porous membranes, characterization of non-ionic membranes. Preparation of synthetic membranes. Preparation techniques for immersion precipitation, preparation techniques for composite membranes, influence of various parameters on membrane morphology, preparation of inorganic membranes. Transport process in membrane driving force. Polarization phenomenon and fouling concentration polarization, characteristic flux behavior in pressure driven membrane preparation, various models, membrane fouling, methods to reduce fouling. Modules and process design- plate and frame, spiral wound, tubular, capillary, hollow fiber modules and liquid membranes.	10

Books Recommended:

Textbooks:

1. Ruthven, D.M., Principal Adsorption & Adsorption Process, Wiley, 1984.
2. Coulson, Richardson, Chemical Engineering, Vol.3, Pergamon.
3. Terybal, R.E, Mass Transfer Operations, McGraw Hill.
4. Snyder, Kirl, Introduction to Liquid Chromatography, 2 ed., 1979. University of Mumbai Chemical Engineering Rev 2014-15 42
5. Marcel Mulder, Basic Concepts of Membrane Technology, Kluwer Academic Publishers (1997).
6. E.J. Hoffman, Membrane Separation Technology, Gulf Professional Publishing.
7. Kaushik Nath, Membrane Separation Process, Prentice Hall of India.
8. J. D. Seader and E. J. Henely, Separation Process Principles.

Reference Books:

1. Lemlich, R., Adsorptive Bubble Separation Techniques, Academic Press, 1972
2. Ruthven, Faruq, Knalbal, Pressure Swing Adsorption, VCH, 1994.
3. Membrane Handbook - Editors W.S. Winston Ho, K.K. Sirkar, Van Nostrand Reinhold Publication.
4. Scott RTW, Liquid Chromatography Column Theory, Wiley, 1992.
5. C. J. King, Separation Processes.

Evaluation Scheme:**Semester End Examination (A):***Theory:*

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):*Theory:*

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to fulfilling minimum passing criteria in the term work.



Syllabus for Final Year Chemical Engineering - Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year Chemical Engineering					Semester : VIII					
Course : Project Engineering & Entrepreneurship Management					Course Code: DJ19CHEC8013					
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Pre-requisite: NIL

Objectives:

1. Project management demands the judicious mix of science, arts and technology, so the objective is to project the scientific aspects of project management.
2. To amidst real life constraints for the benefit of the individual, project and society.
3. To learn entrepreneurship for the improvement of technology, product and the society for the economic growth.

Outcomes:

1. To prepare students for an exciting, challenging and rewarding managerial career.
2. To insight students in identifying opportunities, creating and starting a venture, financing and managing the venture.

Detailed Syllabus: (unit wise)		
Unit	Description	Durat ion (Hrs)
1	Introduction: Definition of project, project management, project life cycle, project types, Project over runs, Role, responsibilities demands on project manager.	04
2	Project initiation: Feasibility reports of various types project selection criteria, project licensing, Basic and detailed engineering, Guarantees, Liabilities, Risk insurance, types of estimates.	06
3	Project clearances: Various laws & regulations, List of various clearances, Intellectual property rights, Patents, need for clearances and influences on project, management, LOI.	03

4	Project organization: Various forms of pure project, matrix and mixed type. Project team, responsibilities of various members.	03
5	Project planning: WBS, responsibility charts, contracts, types, role of contractor, sub-contractor consultant, selection criteria and appointment procedure	05
6	Project Scheduling and execution: CPM and PERT, GANTT charts, LOB , Resource allocation, ABC and VED Analysis , Economic Order Quantity (EOQ), CAT vs RAT.	10
7	Project termination: Commissioning, start up, stabilization, close out.	06
8	Entrepreneurship: Definition of entrepreneurship, Concept of entrepreneur and entrepreneurship, Characteristics, aspects of entrepreneurship, factors affecting entrepreneurship. Classification and types of entrepreneurship based on business, technology, motivation, growth and stages of development.	05

Books Recommended:

Textbooks:

1. Jack R. Meredith, Samuel J. Mantel, Project Management: A Managerial Approach, Wiley India Pvt. Limited, 2010.
2. Vasant Desai, The Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, 2018.

Reference Books:

1. Lester, Albert. Project Management, Planning and Control: Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards. Netherlands, Elsevier/Butterworth-Heinemann, 2007.
2. Nicholas, John M., and Steyn, Herman. Project management for business, engineering, and technology: principles and practice. Boston, Elsevier Butterworth Heinemann, 2008.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

**Syllabus for Fourth Year Chemical Engineering - Semester VIII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering					Semester : VIII				
Course : Instrumentation					Course Code:DJ19CHEC8014				
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lecture s	Practic al	Tutoria l	Total Credit s	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practic al	Oral & Practi cal	Laborato ry Work	Tutorial / Mini project / presentatio n/ Journal	
				--	--	--	--	--	--
3	-	-	3						--

Pre-requisite:

1. Process Calculations

Objectives:

1. To understand the primary mechanisms of sensors
2. To understand how measured quantities are processed for transmission and control
3. To understand how alarms and interlocks are incorporated into over-all instrumentation and control
4. To understand basic control configurations of typical process units

Outcomes:

After completion of the course, students will be able to:

1. The student will be able to calculate the output of various measuring schemes
2. The student will be able to select a DAQ card for any given application
3. The student will be able to select the appropriate type of instrument for any application
4. The student will be able to prepare a basic control scheme for process units
5. The student will be able to write programs for a PLC.

Detailed Syllabus: (unit wise)		
Unit	Description	Durati on(Hrs) 42
1	Fundamentals of Measuring Instruments: Introduction Standards and Calibration, Elements of Measuring Systems, Classification of Instruments, Performance Characteristics, Errors in Measurement	04
2	Primary Sensing Mechanisms: Introduction, Resistive Sensing Elements, Capacitive Sensing Elements, Inductive Sensing Elements, Thermo-electric Sensing Elements, Piezo-electric Sensing Elements, Elastic Sensing Elements, Pneumatic Sensing Elements, Deferential Pressure Sensing Elements, Expansion Sensing Elements..	04
3	Signal Conversion: Signal Conditioning , Wheatstone Bridge, Potentiometer Measurement System, Signal Processing, Mechanical Amplifier, Electronic Amplifier, A/D and D/A conversion, Signal Transmission, Selection of DAQ cards Programmable Logic Controllers: Introduction, Ladder Logic, Applications of PLCs to typical processes	12
4	Measuring Instruments: Flow Measurement, Temperature Measurement, Level Measurement, Pressure Measurement Valves and Drives: Introduction, Control Valve Characteristics, Sizing and Selection of Valves, Variable Drives.	10
5	Introduction to Safety Relief Systems: Introduction, Types of Relieving Devices, Relief Valves, Rupture Discs, Over-pressurization, Emergency Depressurization, Introduction to SIL Classification, LOPA Methods, Basic Process Control Schemes.	12

Books Recommended:

Reference Books:

1. K. Krishnaswamy and S. Vijayachitra, Industrial Instrumentation, second Edition, New Age International.
2. B. E. Noltingk, Jones Instrument Technology, Vol. 4 and 5, Fourth Edition, Butterworth-Heinemann.
3. W. Bolton, Instrumentation and Control Systems, First Edition, Newnes, Elsevier, 2004.
4. Stephanopoulos, Chemical Process Control, Prentice Hall of India.
5. John P. Bentley, Principles of Measurement Systems, Third edition, Addison Wesley Longman Ltd., UK, 2000.
6. Doebelin E.O, Measurement Systems - Application and Design, Fourth edition, McGraw-Hill International Edition, New York, 1992.

7. Noltingk B.E., Instrumentation Reference Book, 2nd Edition, Butterworth
Heinemann, 1995

Evaluation Scheme:

Semester End Examination (A):

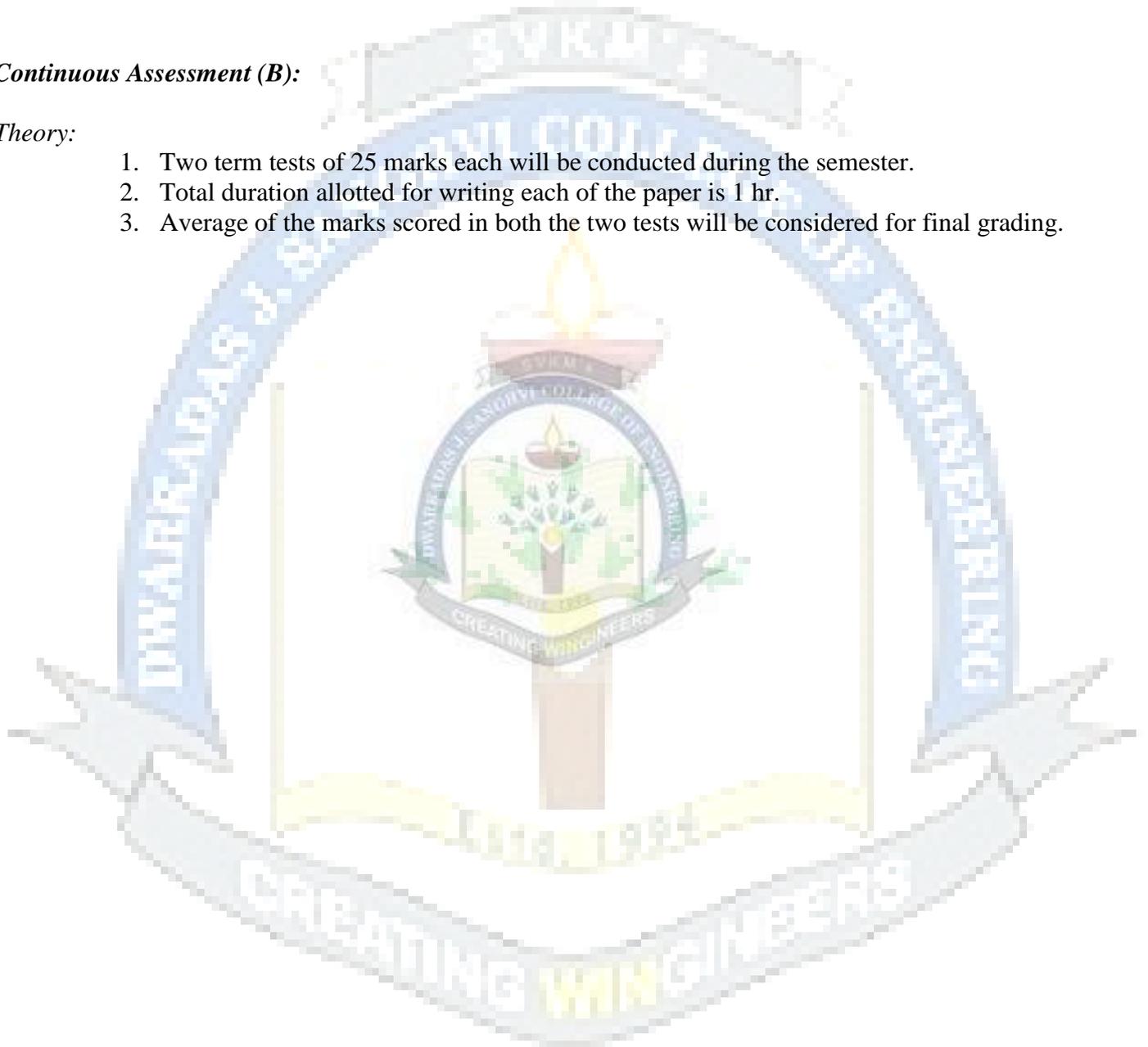
Theory:

1. Question paper based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



**Syllabus for Fourth Year Chemical Engineering - Semester VIII (Autonomous)
(Academic Year 2022-2023)**

Program: Fourth Year Chemical Engineering							Semester : VIII			
Course : Project Stage-II							Course Code: DJ19CHP801			
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				--			--	--	--	
				Laboratory Examination			Term work		Total Term work	200
				Oral	Practical	Oral & Practical	Laborat ory Work	Tutorial / Mini project / presentation/ Journal		
				100	--	--	--	100	100	

Details (same as in Sem-VII)

- Project Groups: Students can form groups with not more than 3(Three).
- Students should spend considerable time in applying all the concepts studied, into the project. Hence, six hours each are allotted in Project to the students.
- Students are advised to take up industrial/ experimental oriented/ simulation and/or optimization based topics for their projects.

The final certification and acceptance of term work will be subject to fulfilling minimum passing criteria in the term work.

Prepared by

Checked by

Head of the Department

Principal



Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus (DJ19)

Final Year B.Tech.

(Semester VII and VIII)

for

Institute Level Electives

Common for All Programs

Revision: 1 (2019)

With effect from the Academic Year: 2022-2023

Institute Level Optional Subjects offered

Semester VII

Sr.	Code	Subjects
1	DJ19ILO7011	Product Lifecycle Management (PLM)
2	DJ19ILO7012	Management Information System (MIS)
3	DJ19ILO7013	Operations Research (OR)
4	DJ19ILO7014	Cyber Security and Laws (CSL)
5	DJ19ILO7015	Personal Finance Management (PFM)
6	DJ19ILO7016	Energy Audit and Management (EAM)
7	DJ19ILO7017	Disaster Management and Mitigation Measures (DMM)
8	DJ19ILO7018	Science of Wellbeing (SW)
9	DJ19ILO7019	Research Methodology (RM)
10	DJ19ILO7020	Public Systems and Policies (PSP)

Semester VIII

Sr.	Code	Subjects
1	DJ19ILO8021	Project Management (PM)
2	DJ19ILO8022	Entrepreneurship Development and Management (EDM)
3	DJ19ILO8023	Corporate Social Responsibility (CSR)
4	DJ19ILO8024	Human Resource Management (HRM)
5	DJ19ILO8025	Corporate Finance Management (CFM)
6	DJ19ILO8026	Logistics and Supply Chain Management (LSCM)
7	DJ19ILO8027	IPR and Patenting (IPR)
8	DJ19ILO8028	Digital Marketing Management (DMM)
9	DJ19ILO8029	Environmental Management (EM)
10	DJ19ILO8030	Labour and Corporate Law (LCL)

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII					
Course: Product Life Cycle Management				Course Code: DJ19ILO7011					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	--	--	3	--	--	--	--	--	--

Pre-requisite: Knowledge of basic concepts of Management.

Objectives:

1. To familiarize the students with the need, benefits and components of PLM
2. To acquaint students with Product Data Management & PLM strategies
3. To give insights into new product development program and guidelines for designing and developing a product
4. To familiarize the students with Virtual Product Development

Outcomes: On completion of the course, learner will be able to:

1. Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation.
2. Illustrate various approaches and techniques for designing and developing products.
3. Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc.
4. Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<p>Introduction to Product Lifecycle Management (PLM): Product Lifecycle Management (PLM), Need for PLM, Product Lifecycle Phases, Opportunities of Globalization, Pre-PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLM Initiative, PLM Applications</p> <p>PLM Strategies: Industrial strategies, Strategy elements, its identification, selection and implementation, Developing PLM Vision and PLM Strategy, Change management for PLM</p>	10
2	<p>Product Design: Product Design and Development Process, Engineering Design, Organization and Decomposition in Product Design, Typologies of Design Process Models, Reference Model, Product Design in the Context of the Product Development Process, Relation with the Development Process Planning Phase, Relation with the Post design Planning Phase, Methodological Evolution in Product Design, Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering and Life Cycle Approach, New Product Development (NPD) and Strategies, Product Configuration and Variant Management, The Design for X System, Objective Properties and Design for X Tools, Choice of Design for X Tools and Their Use in the Design Process</p>	08
3	<p>Product Data Management (PDM): Product and Product Data, PDM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation</p> <p>Virtual Product Development Tools: For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock-up, Model building, Model analysis, Modelling and simulations in Product Design, Examples/Case studies</p>	08
4	<p>Integration of Environmental Aspects in Product Design: Sustainable Development Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process, Life Cycle Environmental Strategies and Considerations for Product Design.</p>	08
5	<p>Life Cycle Assessment and Life Cycle Cost Analysis: Properties, and Framework of Life Cycle Assessment, Phases of LCA in ISO Standards, Fields of Application and Limitations of Life Cycle Assessment, Cost Analysis and the Life Cycle Approach, General Framework for LCCA, Evolution of Models for Product Life Cycle Cost Analysis</p>	08

Books Recommended:

Text books:

1. Product Lifecycle Management: Paradigm for 21st Century Product Realization, John Stark, Springer-Verlag, 2004.
2. Product Design for the environment-A life cycle approach, Fabio Giudice, Guido La Rosa, Antonino Risitano, Taylor & Francis 2006.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Reference Books:

1. Product Life Cycle Managementl, Saaksvuori Antti, Immonen Anselmie, Springer, Dreamtech.
2. Product Lifecycle Management: Driving the next generation of lean thinking, Michael Grieve, Tata McGraw Hill, 2006.
3. Product Life-Cycle Management: Geometric Variations, François Villeneuve, Luc Mathieu, Max Giordano, Wiley, 2010.

Evaluation Scheme:

Semester End Examination (A):

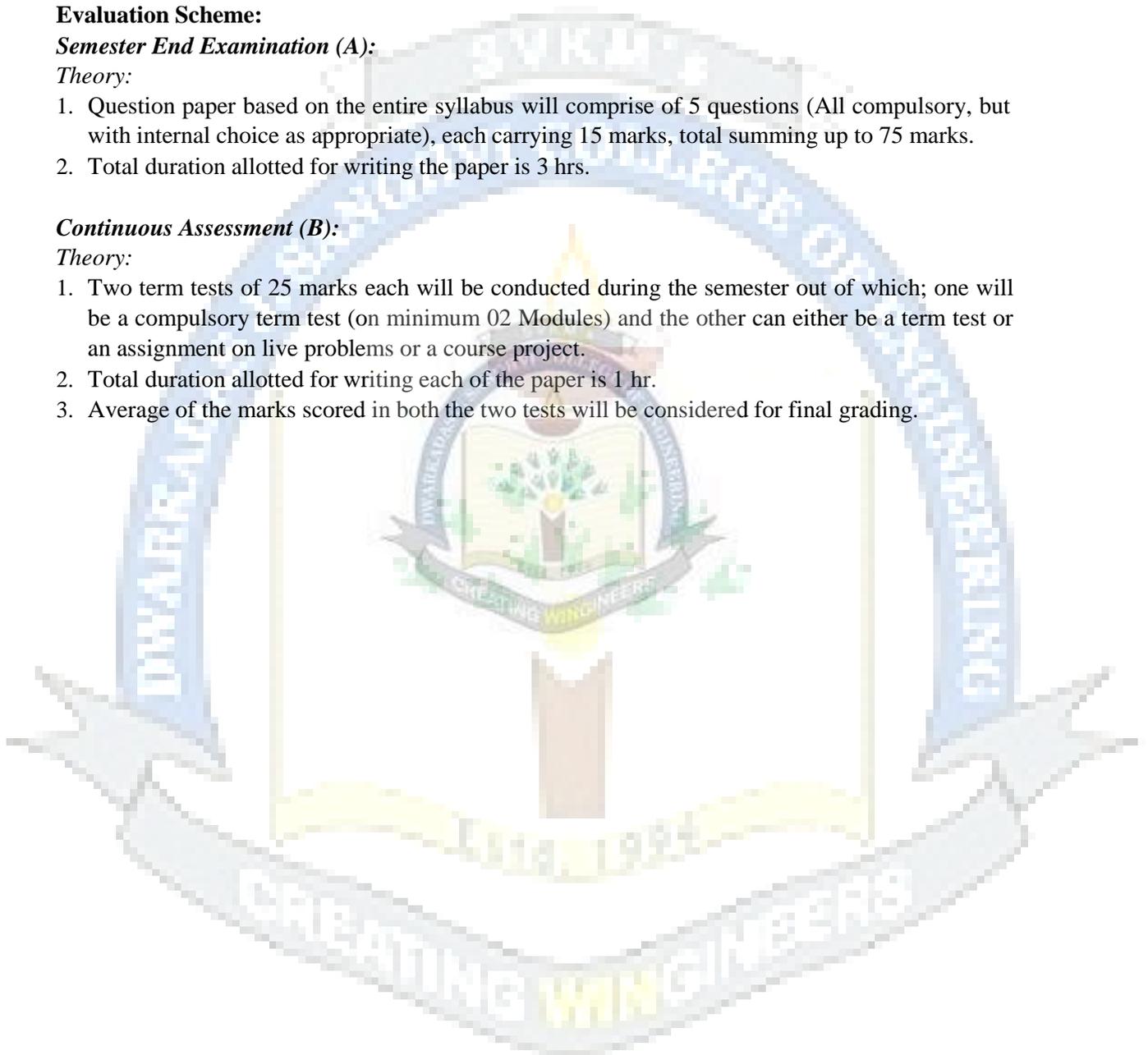
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII					
Course: Management Information System				Course Code: DJ19ILO7012					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. The course is blend of Management and Technical field.
2. Discuss the roles played by information technology in today's business and define various technology architectures on which information systems are built
3. Define and analyze typical functional information systems and identify how they meet the needsof the firm to deliver efficiency and competitive advantage
4. Identify the basic steps in systems development

Outcomes: Learner will be able to...

1. Explain how information systems Transform Business
2. Identify the impact information systems have on an organization
3. Describe IT infrastructure and its components and its current trends
4. Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making
5. Identify the types of systems used for enterprise-wide knowledge management and how they provide value for businesses

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Foundation Concepts: Information Systems in Business, Functional Area Information System, The Components of Information Systems, Impact of IT on organizations and society, Organizational Strategy, Information systems for strategic advantage.	05
2	Information Technologies: Hardware and Software Computer Systems: End User and Enterprise Computing Computer Peripherals: Input, Output, and Storage Technologies Application Software: End User Applications System Software: Computer System Management Data Resource Management: Technical Foundations of Database Management, Managing Data Resources, Big data, Data warehouse and Data Marts, Knowledge Management Networks: The Networked Enterprise (Wired and wireless), Pervasive computing, Cloud Computing models	08
3	MIS Tools and applications for Decision making: ERP and ERP support of Business Process Reengineering, Business intelligence (BI): Managers and Decision Making, BI for Data analysis and Visualization Artificial Intelligence Technologies in Business	08
4	Security and Ethical Challenges: Security, Ethical, and Societal Challenges of IT Security Management of Information Technology	06
5	Social Computing (SC): Web 2.0 and 3.0, SC in business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce – B2B B2C, Mobile commerce.	07
6	Information System within Organization: Acquiring Information Systems and Applications: Various System development life cycle models. Enterprise and Global Management of Information Technology: Managing Information Technology, Managing Global IT.	08

Books Recommended:

Reference Books:

1. Management Information Systems, 11th edition by James A O'Brien, George M., Ramesh Behl.
2. Kelly Rainer, Brad Prince, Management Information Systems, Wiley.
3. K.C. Laudon and J.P. Laudon, Management Information Systems: Managing the Digital Firm, 10th Ed., Prentice Hall, 2007.
4. D. Boddy, A. Boonstra, Managing Information Systems: Strategy and Organization, Prentice Hall, 2008

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Evaluation Scheme:

Semester End Examination (A):

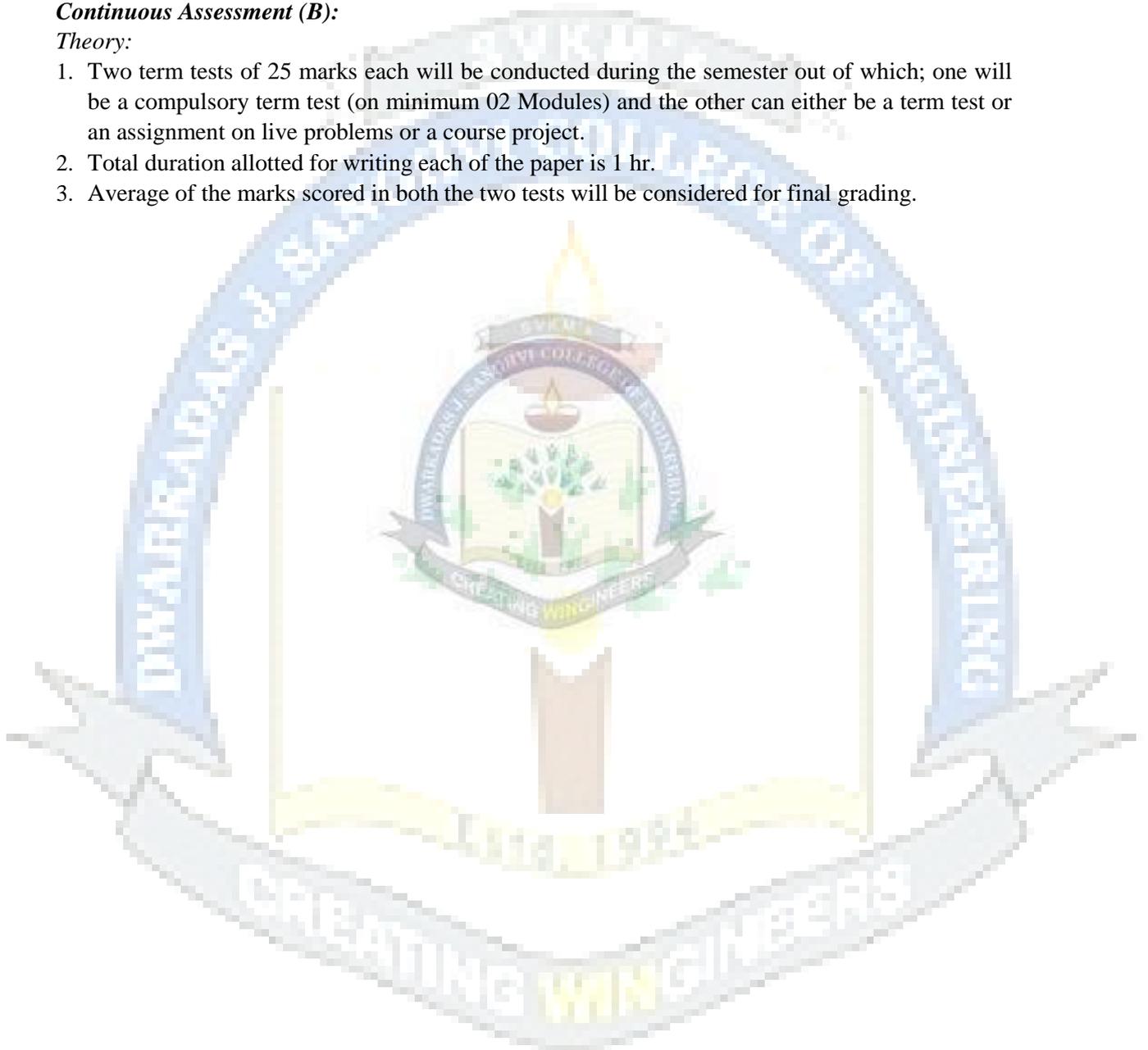
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII					
Course: Operations Research				Course Code: DJ19ILO7013					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Pre-requisites: Basic Knowledge of Algebra, Probability and Statistics.

Objectives:

1. To formulate a real-world decision problem as a mathematical programming model.
2. To learn the mathematical tools that are employed to solve mathematical programming models.

Outcomes: On completion of the course, learner will be able to:

1. **Convert** a real-world problem in to a Linear Programming Problem and **analyse** the solution obtained using Simplex method or other algorithms.
2. **Identify** real-world problems as Transportation Problem and Assignment Problem and **Solve** the decision problem by choosing appropriate algorithm.
3. **Identify** the decision situations which vary with time and **analyse** them using principle of dynamic programming to real life situations.
4. **Explain** reasons of formation of queues, classify various queuing systems and **apply** parameters defined for various queuing systems for decision making in real life situations.
5. **Understand** the concept of decision making in situation of competition and **recommend** strategies in case of two-person zero sum games.
6. **Describe** concept of simulation and **apply** Monte Carlo Simulation technique to systems such as inventory, queuing and **recommend** solutions for them.
7. **Understand** need for right replacement policy and **determine** optimal replacement age.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Introduction to Operations Research: Concept of decision making. Definition of OR. Formulation of decision problem as OR model, Concept of Optimization, Linear Programming Problem: Mathematical Formulation. Finding optimal solution - Graphical method, Simplex Method, Big M-method, Two Phase Method. Duality, Primal – Dual construction, Symmetric and Asymmetric Dual. Dual Simplex Method.	10
2	Assignment Problems: Mathematical Formulation, Finding optimal solution - Hungarian Method Transportation problem: Mathematical Formulation, Finding initial basic feasible solution – Northwest corner rule, row minima, column minima, least cost method and Vogel’s approximation method. Optimality test: the stepping stone method and MODI method. Improving the solution.	08
3	Dynamic Programming: Bellman’s Principle of optimality - Applications of dynamic programming- Employment smoothening problem, capital budgeting problem, shortest path problem, cargo loading problem	06
4	Queuing Models: Characteristics of queuing models. Single Channel – Single and multi phase servers, Poisson arrivals, exponential service time - with infinite population and finite population models – with infinite and finite capacity. Multichannel – Single phase server - Poisson arrivals, exponential service time with infinite population. Game Theory: Introduction. Minimax & Maximin Criterion and optimal strategy. Solution of games with saddle points, rectangular games without saddle points - 2 x 2 games, dominance principle. Approximate methods - Iterative method, m x 2 & 2 x n games -Graphical method and method of sub-games. Expressing game as LPP.	10
5	Simulation: Definition. Types of simulation models. Monte Carlo simulation technique. Applications of simulation - Inventory and Queuing problems. Simulation Languages. Replacement Models: Replacement of items that deteriorate with time - when money value is not counted and counted, Replacement of items that fail suddenly – individual and group replacement policy.	08

Note: Educator is expected to introduce relevant software available for solving various mathematical models.

Books Recommended:

Text books:

1. Operations Research, Sharma J. K., Trinity Press
2. Operations Research, Gupta P. K., Hira D. S., S. Chand Limited

Reference Books:

1. Operations Research - An Introduction; Taha, H.A.; Prentice Hall

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

2. Operations Research: Principles and Practice; Ravindran, A, Phillips, D. T and Solberg, J. J.; John Willey and Sons
3. Introduction to Operations Research; Hiller, F. S. and Liebermann, G. J.; Tata McGraw Hill
4. Operations Research Principles and Practice; Pradeep Prabhakar Pai; Oxford University Press
5. Operations Research, R. Panneerselvam, PHI Publications.
6. Operations Research, A. M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education.
7. Operations Research; Kanti Swarup, P. K. Gupta and Man Mohan; Sultan Chand & Sons

Evaluation Scheme:

Semester End Examination (A):

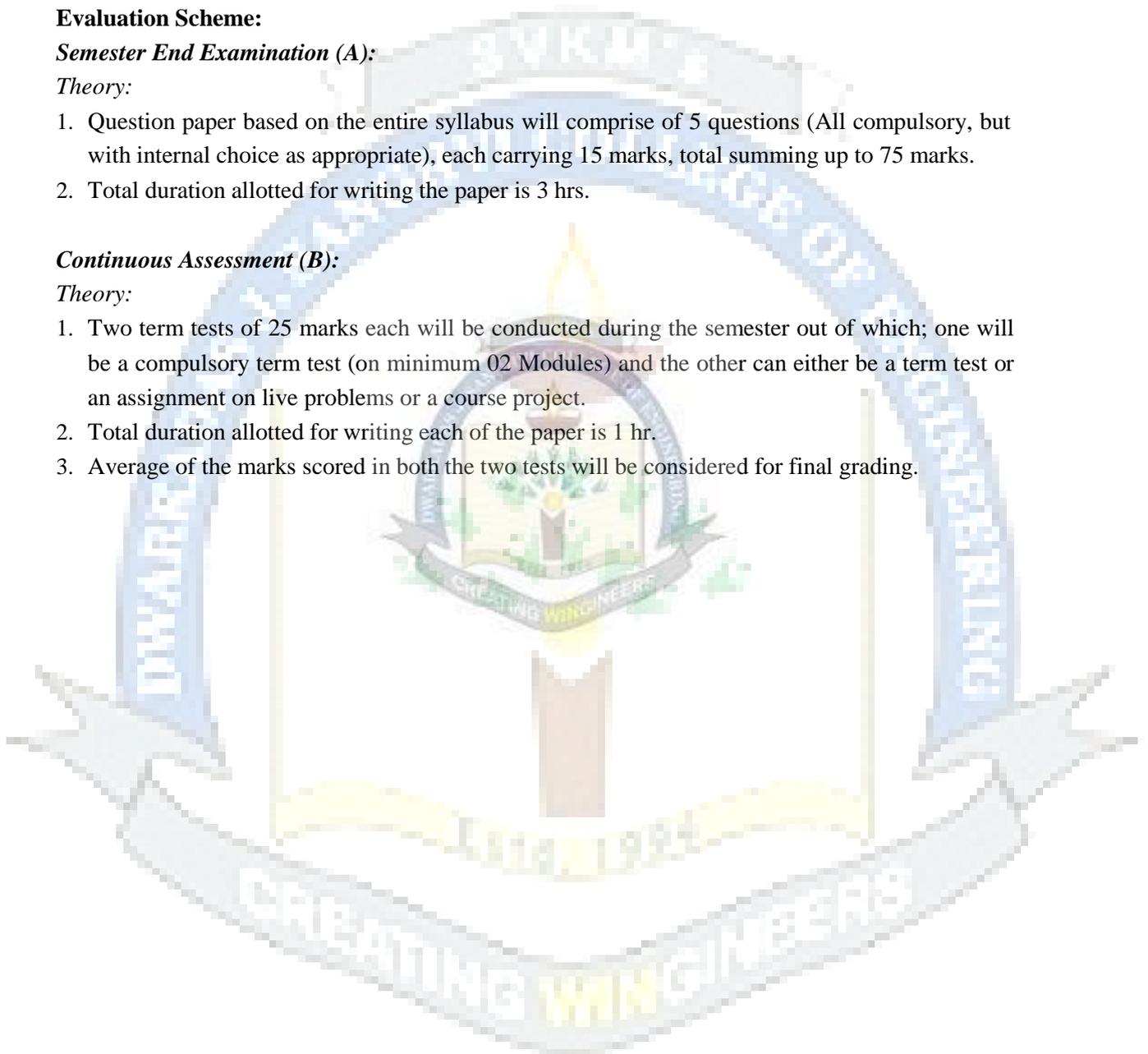
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII						
Course: Cyber Security and Laws				Course Code: DJ19ILO7014						
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
								75		
				Laboratory Examination			Term work		Total Term work	
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal		
3	--	--	3	--	--	--	--	--	--	--

Objectives:

1. To understand and identify different types cybercrime and cyber offences.
2. To recognized Indian IT Act 2008 and its latest amendments
3. To learn various types of security standards compliances

Outcomes: On completion of the course, learner will be able to:

1. Understand the different types of cybercrime and security issues E Business.
2. Analyses different types of cyber threats and techniques for security management.
3. Explore the legal requirements and standards for cyber security in various countries to regulate cyberspace.
4. Impart the knowledge of Information Technology Act and legal frame work of right to privacy, data security and data protection.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<p>Introduction to Cybercrime: Cyber Crime, Cyber Law, Cyber Security, History of Cyber Crime, Hacking, Data Theft, Cyber Terrorism, Virus & Worm's, Email Bombing, Pornography, online gambling, Forgery, Web Defacements, Web Jacking, Illegal online Selling, Cyber Defamation, Software Piracy, Electronics/ Digital Signature, Phishing, Password Cracking, Key loggers and Spywares, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing Identity Theft (ID Theft)</p> <p>Cyber offenses: How criminal plan the attacks, Social Engineering, Cyber stalking, Cyber café and Cybercrimes, Botnets, Attack vector</p>	12
2	<p>Cyber Threats Analysis Knowledge of Dynamic and Deliberate Targeting Knowledge of Indications and Warning Knowledge of Internal Tactics to Anticipate and/or, Emulate Threat Capabilities and Actions Knowledge of Key Cyber Threat Actors and their Equities Knowledge of Specific Target Identifiers and Their Usage</p> <p>Cyber Security Management Knowledge of Emerging Security Issues, Risks, and Vulnerabilities</p>	08
3	<p>Electronic Business and legal issues Evolution and development in Ecommerce, Policy Frameworks for Secure Electronic Business, paper vs paper less contracts, E-Commerce models- B2B, B2C, E security. E-Payment Mechanism; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections, Security for E-Commerce.</p>	06
4	<p>Indian IT Act Cyber Crime and Criminal Justice, Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments</p> <p>Security aspect in cyber Law The Contract Aspects in Cyber Law , The Security Aspect of Cyber Law, The Intellectual Property Aspect in Cyber Law ,The Evidence Aspect in Cyber Law ,The Criminal Aspect in Cyber Law</p>	08
5	<p>Security Industries Standard Compliances IT Security v/s IT Compliance, Cyber Security Standards, critical security controls for cyber security, GRC (Governance, Risk Management, and Compliance), SOX, GLBA, HIPAA, ISO/IEC 27001, NIST Cyber Security Framework (CSF), PCI-DSS.</p> <p>OWASP Top Ten Project, GDPR (General Data Protection Regulation), NIST (National Institute of Standards and Technology), CIS Controls (Center for Internet Security Controls)</p>	08

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Books Recommended:

Reference Books and Material:

1. Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, New Delhi
2. The Indian Cyber Law by Suresh T. Vishwanathan; Bharat Law House New Delhi
3. The Information Technology Act, 2000; Bare Act- Professional Book Publishers, New Delhi.
4. E-Commerce Security and Privacy", Anup K. Ghosh, Springer Science and Business Media, 2012
5. Izzat Alsmadi , The NICE Cyber Security Framework Cyber Security Intelligence and Analytics, Springer
6. Cyber Law & Cyber Crimes, Advocate Prashant Mali; Snow White Publications, Mumbai
7. Nina Godbole, Information Systems Security, Wiley India, New Delhi
8. Kenneth J. Knapp, Cyber Security & Global Information Assurance Information Science Publishing.
9. William Stallings, Cryptography and Network Security, Pearson Publication
10. Websites for more information is available on : The Information Technology ACT, 2008-TIFR : <https://www.tifrh.res.in>
11. Website for more information, A Compliance Primer for IT professional:
<https://www.sans.org/reading-room/whitepapers/compliance/compliance-primer-professionals-33538>

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII					
Course: Personal Finance Management				Course Code: DJ19ILO7015					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination		Term work			Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Pre-requisites: Basic Knowledge of Algebra, Probability and Statistics.

Objectives:

1. To create awareness and educate consumers on access to financial services.
2. To make the students understand the basic concepts, definitions and terms related to direct taxation.
3. To help the students compute the Goods and Service Tax (GST) payable by a supplier after considering the eligible input tax credit.
4. To familiarise the students with microfinance for accelerating the expansion of local microbusinesses.

Outcomes: On completion of the course, learner will be able to:

1. Use a framework for financial planning to understand the overall role finances play in his/her personal life.
2. Compute income from salaries, house property, business/profession, capital gains and income from other sources.
3. Compute the amount of CGST, SGST and IGST payable after considering the eligible input tax credit.
4. Understand how Microfinance can help in financial inclusion.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
01	<p>Overview of Indian Financial System: Characteristics, Components and Functions of Financial System. Financial Instruments and Financial Markets, Financial inclusion.</p> <p>Introduction to Personal Finance Person Financial Planning in Action, Money Management Skills, Taxes in Your Financial Plan, Savings and Payment Services. Consumer Credit: Advantages, Disadvantages, Sources and Costs.</p>	07
02	<p>Personal Financial Management Loans: Home, Car, Education, Personal, Loan against property and Jewel loan. Insurance: Types of Insurance – ULIP and Term; Health and Disability Income Insurance, Life Insurance. Investment: Investing Basics and Evaluating Bonds, Investing in Stocks and Investing in Mutual Funds, Planning for the Future.</p>	07
03	<p>Income Tax Income Tax Act Basics- Introduction to Income Tax Act, 1961 Heads of Income and Computation of Total Income and Tax Liability- Heads of Income and Computation of Total Income under various heads, Clubbing Provisions, Set off and Carry forward of Losses, Deductions, Assessment of Income and tax liability of different persons. Tax Management, Administrative Procedures and ICDS - TDS, TCS and Advance Tax Administrative Procedures, ICDS.</p>	08
04	<p>Goods and Services Tax GST Constitutional framework of Indirect Taxes before GST (Taxation Powers of Union & State Government); Concept of VAT: Meaning, Variants and Methods; Major Defects in the structure of Indirect Taxes prior to GST; Rationale for GST; Structure of GST (SGST, CGST, UTGST & IGST); GST Council, GST Network, State Compensation Mechanism, Registration. Levy and Collection of GST Taxable event- "Supply" of Goods and Services; Place of Supply: Within state, Interstate, Import and Export; Time of supply: Valuation for GST- Valuation rules, taxability of reimbursement of expenses; Exemption from GST: Small supplies and Composition Scheme: Classification of Goods and Services</p>	10
05	<p>Introduction to Micro – finance Micro-Finance: Definitions, Scope & Assumptions, Types of Microfinance, Customers of Micro-finance, Credit Delivery Methodologies, SHG concept, origin, Formation & Operation of Self Help Groups (SHGs). Models in Microfinance - Joint Liability Groups (JLG), SHG Bank Linkage Model and GRAMEEN Model: Achievements & Challenges, Institutional Mechanism Current Challenges for Microfinance, Microfinance Institutions (MFIs): Constraints & Governance Issues, Institutional Structure of Microfinance in India :NGO-MFIs, NBFC-MFIs, Co-operatives, Banks, Microfinance Networks and Associations; Demand & Supply of Microfinance Services in India, Impact assessment and social assessments of MFIs,</p>	10

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Books Recommended:

Reference Books:

1. Banking and Financial Sector Reforms in India , by Asha Singh, M.S. Gupta, Serials Publication.
2. Indian Banking Sector: Essays and Issues (1st) , by M.S. Gupta & J.B. Singh, Serials Publication.
3. Basics Of Banking & Finance , by K.M. Bhattacharya O.P. Agarwal , Himalaya Publishing House
4. Agricultural Finance And Management, by S. Subba Reddy , P. Raghu Ram .
5. The Indian Financial System And Development , by Dr. Vasant Desai, Himalaya Publishing House; Fourth Edition
6. Income Tax Management , Simple Way of Tax Management, Tax Planning and Tax Saving , By Sanjay Kumar Satapathy
7. Direct Tax System Income Tax by Dr. R. K. Jain, SBPD Publications.
8. Simplified Approach to GST Goods and Services Tax, By S K Mishra , Educreation Publishing.
9. Introduction To Microfinance , By Todd A Watkins , World Scientific Publishing Company

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Consisting **One Class Tests for 25 marks** based on approximately 50% of contents and one case study with presentations for 25 Marks.
2. Total duration allotted for writing test paper is 1 hr.
3. Average of the marks scored in the tests and case study will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII					
Course: Energy Audit and Management				Course Code: DJ19ILO7016					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. To understand the importance of energy security for sustainable development and the fundamentals of energy conservation.
2. To identify and describe the basic principles and methodologies adopted in energy audit of a utility
3. To introduce performance evaluation criteria of various electrical and thermal installations to facilitate the energy management.
4. To relate the data collected during performance evaluation of systems for identification of energy saving opportunities.

Outcomes: On completion of the course, learner will be able to:

1. To identify and describe present state of energy security and its importance.
2. To identify and describe the basic principles and methodologies adopted in energy audit of a utility.
3. To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities.
4. To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities.
5. To analyze the data collected during performance evaluation and recommend energy saving measures.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
01	Energy Scenario: Present Energy Scenario, Energy Pricing, Energy Sector Reforms, Energy Security, Energy Conservation and its Importance, Energy Conservation Act-2001 and its Features. Basics of Energy and its various forms, Material and Energy balance.	05
02	Energy Audit: Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution. Elements of monitoring & targeting, Energy audit instruments. Technical and economic feasibility, Classification of energy conservation measures. Safety considerations during energy audit. Financial analysis techniques: Simple payback period, NPV, Return on investment (ROI) Internal rate of return (IRR).	10
03	Energy Management and Energy Conservation in Electrical System: Electricity billing, Electrical load management and maximum demand Control; Power factor improvement, Energy efficient equipments and appliances, star ratings. Energy efficiency measures in lighting system, lighting control: Occupancy sensors, daylight integration, and use of intelligent controllers. Energy conservation opportunities in water pumps, compressor, fan and blower. industrial drives, induction motors, motor retrofitting, soft starters, variable speed drives.	10
04	Energy Management and Energy Conservation in Thermal Systems: Review of different thermal loads; Energy conservation opportunities in: Steam distribution system, Steam leakages, Steam trapping, Condensate and flash steam recovery system. Waste heat recovery, use of insulation- types and application. Energy conservation opportunities in: Boiler system. Refrigeration system and HVAC system.	10
05	Energy conservation in Buildings: Energy Conservation Building Codes (ECBC): Green Building, LEED rating, Application of Non-Conventional and Renewable Energy Sources, Energy sources and energy management in electric vehicles.	07

Books Recommended:

Reference Books:

1. Handbook of Electrical Installation Practice, Geofry Stokes, Blackwell Science.
2. Designing with light: Lighting Handbook, By Anil Valia, Lighting System.
3. Energy Management Handbook, By W.C. Turner, John Wiley and Sons.
4. Handbook on Energy Audits and Management, edited by A. K. Tyagi, Tata Energy Research Institute (TERI).
5. Energy Management Principles, C.B. Smith, Pergamon Press.
6. Energy Conservation Guidebook, Dale R. Patrick, S. Fardo, Ray E. Richardson, Fairmont Press.
7. Handbook of Energy Audits, Albert Thumann, W. J. Younger, T. Niehus, CRC Press.
8. www.energymanagertraining.com
9. www.bee-india.nic.in

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Evaluation Scheme:

Semester End Examination (A):

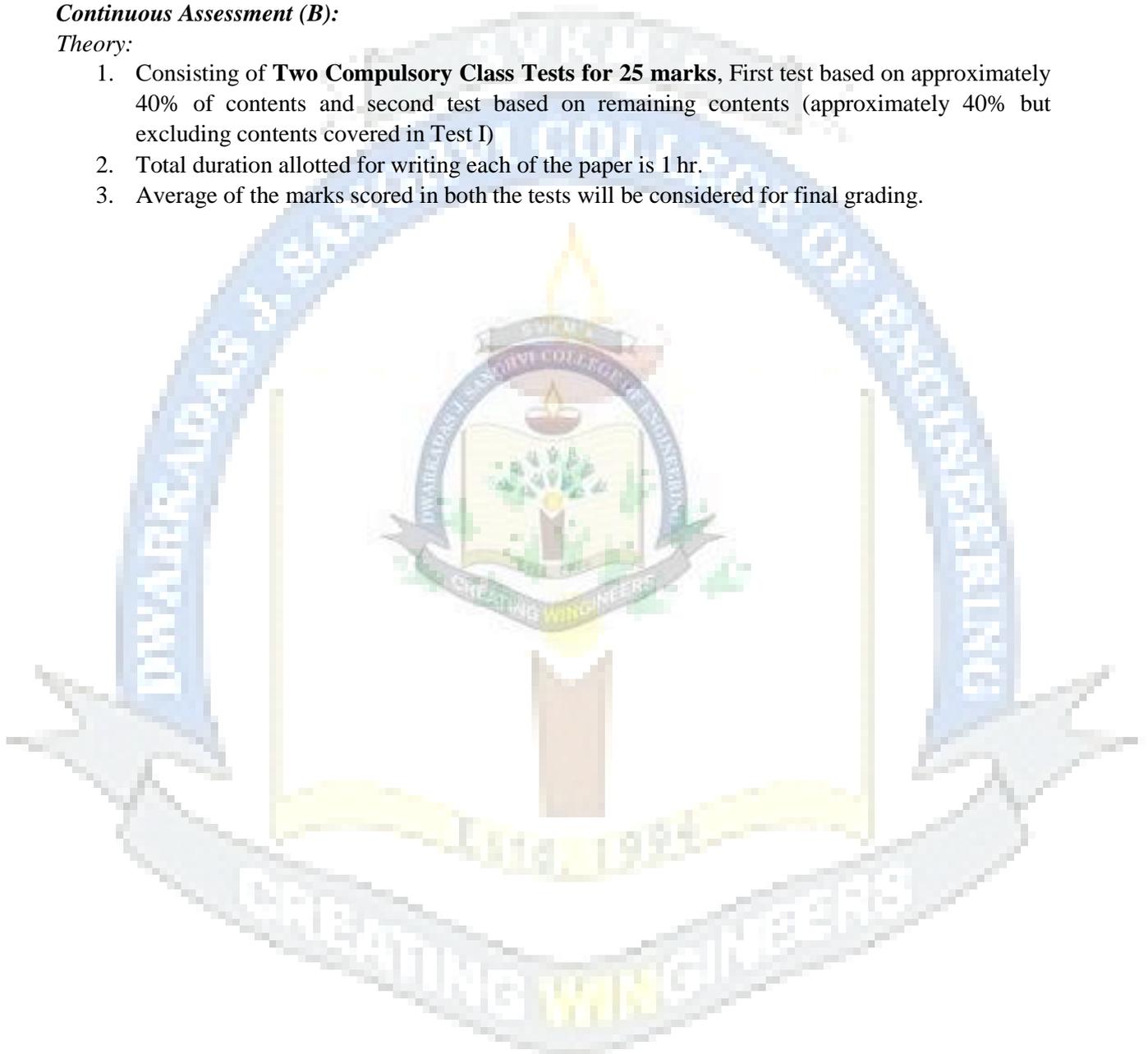
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Consisting of **Two Compulsory Class Tests for 25 marks**, First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII					
Course: Disaster Management and Mitigation Measures				Course Code: DJ19ILO7017					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. To provide basic understanding hazards, disaster and various types and categories of disaster occurring around the world.
2. To identify extent and damaging capacity of a disaster.
3. To study and understand the means of losses and methods to overcome /minimize it.
4. To understand roles and responsibilities of individual and various organization during and after disaster.
5. To appreciate the significance of GIS, GPS in the field of disaster management.
6. To understand the emergency government response structures before, during and after disaster.

Outcomes: On completion of the course, learner will be able to:

1. Know natural as well as manmade disaster and their extent and possible effects on the economy.
2. Know the institutional framework and organization structure in India for disaster management and get acquainted with government policies, acts and various emergency laws.
3. Get to know the simple dos and don'ts in such extreme events and build skills to respond accordingly.
4. Understand the importance of disaster prevention and various mitigation measure with the exposure to disasters hotspots across the globe.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<p>General Information about Disaster: Brief concept of Hazards, definition and types of Disasters – Natural, Man-made, and hybrid, Groups of Disasters- Natural and Technological, global Scenario, Significance of studying various aspects of disasters, effects of disasters, India’s vulnerability to disasters, Impact of disaster on National development.</p> <p>Study of Natural disasters: Flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion etc.</p> <p>Study of Human/Technology Induced Disasters: Chemical, Industrial and Nuclear disasters, Internally displaced persons, road and train accidents Fire Hazards, terrorism, militancy, Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.</p>	10
2	<p>Disaster Management: Brief Introduction, Disaster management cycle, Evolution of Disaster and Disaster management in India, Disaster management acts, policies and guidelines, laws of emergencies etc.</p> <p>Prior, During and Post disaster management activities: (Preparedness, strengthening emergency centers, Logistics, optimum resource management, emergency response and relief, Training, Public awareness, Research, Reconstruction of essential services and livelihood restoration.</p>	08
3	<p>Institutional framework and Mechanism for disaster management in India: Institutions in India for dealing with various disasters, Organizational structure, functions and responsibilities of National Institute of Disaster Management (NIDM) and National disaster management authority (NDMA) in India, roles and responsibilities of central and state government during and after disaster, NGO’s involved in disasters and their task, Jobs carried out by armed forces.</p> <p>Financial Relief During disaster (State, National and International Disaster Assistance)</p>	08
4	<p>Disaster risk reduction and Mitigation Measures: Need of disaster prevention and mitigation, mitigation guiding principles, challenging areas, structural and non-structural measures for disaster risk reduction.</p> <p>Mitigation measures for flood, earthquake, cyclone monitoring, air quality, water quality, climate change, land use, winter storms and aquatic biology etc.</p> <p>Use of information management, GIS, GPS and remote sensing Mitigation measure.</p> <p>Do’s and don’ts in case of disasters and effective implementation of relief aids.</p>	08
5	<p>Case studies on disaster (National /International): Case study discussion of Hiroshima – Nagasaki (Japan), India – Tsunami (2004) , Bhopal gas tragedy, Kerala and Uttarakhand flood disaster, Cyclone Phailin (2013), Fukushima Daiichi nuclear disaster (2011), 26th July 2005 Mumbai flood, Chernobyl meltdown and so on.</p> <p>(Discuss case studies on disaster with respect to reason for the disaster, incidents, effects of disaster, present scenario and safety measures taken)</p>	08

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Books Recommended:

Reference Books and Reports:

1. Disaster Management, by Harsh K.Gupta, Universities Press Publications (2003).
2. Disaster Management: An Appraisal of Institutional Mechanisms in India, by O.S.Dagur, published by Centre for land warfare studies, New Delhi, 2011.
3. Introduction to International Disaster Management, by Damon Copolla, Butterworth Heinemann Elsevier Publications (2015).
4. Disaster Management Handbook, by Jack Pinkowski, CRC Press, Taylor and Francis group (2008).
5. Disaster management & rehabilitation, by Rajdeep Dasgupta, Mittal Publications, New Delhi (2007).
6. Natural Hazards and Disaster Management, Vulnerability and Mitigation, by R B Singh, Rawat Publications (2006).
7. Concepts and Techniques of GIS, by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications (2006).
8. Risk management of natural disasters, by Claudia G. Flores Gonzales, KIT Scientific Publishing (2010).
9. Disaster Management – a disaster manger’s handbook, by W. Nick Carter, Asian Development Bank (2008).
10. Disaster Management in India, by R. K. Srivastava, Ministry of Home Affairs, GoI, New Delhi (2011)
11. The Chernobyl Disaster: Legacy and Impact on the Future of Nuclear Energy, by Wil Mara, Marshall Cavendish Corporation, New York, 2011.
12. The Fukushima 2011 Disaster, by Ronald Eisler, Taylor & Francis, Florida, 2013.
(Learners are expected to refer reports published at national and international level and updated information available on authentic web sites)

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII					
Course: Science of Well-being				Course Code: DJ19ILO7018					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. To create consciousness about importance of holistic health and physical as well as mental well-being.
2. To make learners aware of the concepts of Happiness, Gratitude, Self-Compassion, Empathy etc.
3. To introduce the learners to the means of mental and physical well-being, ill effects of mal-practices like alcoholism, smoking etc.
4. To equip the learners to manage and cope up with stress in their daily living.

Outcomes: Upon Completion of the course, the learner should be able to:

1. Describe concepts of holistic health and well-being, differentiate between its true meaning and misconceptions and understand the benefits of well-being.
2. Recognize meaning of happiness, practice gratitude and self-compassion and analyze incidents from one's own life.
3. Understand the causes and effects of stress, identify reasons for stress in one's own surrounding and self.
4. Recognize the importance of physical health and fitness, assess their life style and come up with limitations or effectiveness.
5. Inspect one's own coping mechanism, assess its effectiveness, develop and strategize for betterment and execute it.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Health and well-being: The concept of health, dimensions of health, the notion of well-being, various facets of well-being, relation between health and well-being. Concept of holistic health, its principles and importance, concept and benefits of holistic care, misconceptions about holistic health approach, the application of a true holistic approach to our well-being.	06
2	Concepts of happiness: Happiness: what is it and how do we measure it? Philosophical perspectives on happiness, Happiness: Nature or Nurture? Happiness in the modern world: impediments and accelerators, Narrow vs. Broad Band Approaches to Happiness, Benefits of Happiness, Self-Compassion and Gratitude. Misconceptions of happiness.	08
3	Stress and mental health/well-being: Nature and concept of stress, meaning and definitions of stress, types of stress, meaning of stressors, types of stressors, symptoms of stress, effects of stress, different models of stress. Sources of stress and how does stress cause illness, various sources of stress, delineate between external and internal sources of stress, differentiate between continuous and discrete stressors, the effects of these stressors on health and well-being, diversity of stressors and their health consequences, relation between stress and illness from different perspectives association between stress related physiological mechanisms and different illnesses.	10
4	Physical Well-being / Health management: concept of health behaviours, dimensions of health behaviours. Health enhancing behaviors: Exercise and Weight control, application and importance of these health enhancing behaviours. Health protective behaviors and illness management: concept of illness management, effectiveness of illness management. Concept of Nutrition, Role of Nutrition, Components of Nutrition, concept of Malnutrition, Health compromising behaviours: Alcoholism, Smoking and its effects on health.	10
5	Dealing with Difficult Times / Coping mechanisms: The concept of chronic stress, Health and safety risks of chronic stress, Forms and Treatment of chronic stress, Coping with Acute and Chronic stress, theories of the stress-illness link, role of stress in mental disorders. Concept of coping, Ways of coping and stress management, basic knowledge about stress management, various techniques of stress management, stress management programs. Mental strengths and virtues, Hope, Optimism, Resilience – concept, pathways and models, Meditation and Self-introspection.	08

Books Recommended:

Textbooks:

1. The Science of well-being by Felicia Huppert, Nick Baylis, Barry Keverne; Oxford University Press
2. Health and Well-Being: Emerging Trends by S. Ojha, U. Rani Srivastava, Shobhna Joshi, Global Vision Publishing House
3. Positive psychology: The scientific and practical explorations of human strengths by Shane J. Lopez, Jennifer Teramoto Pedrotti, Charles Richard Snyder; Sage Publications.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Reference Books:

1. The pursuit of happiness and the realization of sympathy: Cultural patterns of self, social relations, and well-being by Kitayama, S., & Markus, H. R, Culture and subjective well-being, The MIT Press.
2. Man Adapting by Dubos, R; New Haven: Yale University Press.
3. Happiness a history by McMahon D. M., Atlantic Monthly Press.
4. Well-being: The foundations of hedonic psychology by D. Kahneman & E. Diener & N. Schwarz, New York: Russell Sage
5. Selye H. The Stress of Life. New York; McGraw-Hill; 1984.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

**Syllabus for Final Year of B.Tech. Program in Mechanical Engineering:
Semester VII (Autonomous)
(Academic Year 2022-2023)**

Program: Final Year Mechanical Engineering				Semester: VII					
Course: Research Methodology				Course Code: DJ19ILO7019					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Pre-requisites: Basic Knowledge of Probability and Statistics.

Objectives:

1. To understand Research and Research Process
2. To acquaint learners with identifying problems for research and develop research strategies
3. To familiarize learners with the techniques of data collection, analysis of data and interpretation

Outcomes: On completion of the course, learner will be able to:

1. Prepare a preliminary research design for projects in their subject matter areas
2. Accurately collect, analyze and report data
3. Present complex data or situations clearly
4. Review and analyze research findings
5. Write report about findings of research carried out

**Syllabus for Final Year of B.Tech. Program in Mechanical Engineering:
Semester VII (Autonomous)
(Academic Year 2022-2023)**

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Basic Research Concepts Meaning of research, Objectives of research, Types of research, Significance of research Research process	07
2	Research Methodology: Identification of research problem, Literature review, Formulation of hypothesis, Formulation of Research design.	10
3	Research and Sample Design: Meaning of research and sample design, Need of research design, Features of good research design, Important concepts, Different research designs, Types of sampling designs	10
4	Data Collection and Data Analysis: Types of data, Methods for collecting data: Experiments and surveys, Collection of primary and secondary data, Hypothesis testing and interpretation of Data	10
5	Interpretation and Report Writing: Interpretation and drawing conclusions on the research, Preparation of the report, Ethical Issues	05

Books Recommended:

Reference Books:

1. Dawson, Catherine, 2002, Practical Research Methods, New Delhi, UBS Publishers Distributors.
2. Kothari, C.R., 1985, Research Methodology-Methods and Techniques, New Delhi, Wiley Eastern Limited.
3. Kumar, Ranjit, 2005, Research Methodology-A Step-by-Step Guide for Beginners, (2nd Edition), Singapore, Pearson Education

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VII						
Course: Public Systems and Policies				Course Code: DJ19ILO7020						
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
								75		
				Laboratory Examination			Term work		Total Term work	..
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal		
3	--	--	3	--	--	--	--	--	--	--

Pre-requisites: Basic Knowledge of Social science and Current affairs

Objectives:

1. To analyze the transformations in public systems with emphasis on current initiatives and emerging challenges in the field.
2. To understand public systems in a fast-changing environment in the global context.
3. To provide an in-depth understanding of the ills prevailing in the society and aids to identify the solutions for them.
4. To explain public policy and its operations with special focus on policy relating to Government finance.
5. To analyze and evaluate the impact of the public policy on firms and economy at large.

Outcomes: On completion of the course, learner will be able to:

1. Understand the importance of public systems in a fast-changing environment in the global context.
2. Analyze the transformations in public systems with emphasis on current initiatives and emerging challenges in the field.
3. Explain public policy and its operations with special focus on policy relating to Government finance.
4. Make policies and know about the happenings in the world, in the nation and those in their locality.
5. Analyze and evaluate the impact of the public policy on firms and economy at large and work under various fields as policymakers.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Introduction and Overview of Public Systems: Ideology of Public Systems; Mechanistic and Organic view of Society and Individuals, The Legal Framework; Federal Government; State and Local Governments, Government growth; The size of Government.	10
2	Public Sector in the Economics Accounts: Public Sector in the circular flow; Public Sector in the National Income Accounts.	6
3	Public Choice and Fiscal Politics: Direct Democracy; Representative Democracy; The Allocation Function; The Distribution Function; The Stabilization Function; Coordination of Budget Functions; The Leviathan Hypothesis.	8
4	Introduction and Overview of Public Policy: Markets and Government; Social goods and Market failure, Public expenditure and its evaluation; Cost Benefit Analysis, Public policy and Externalities, Taxation Policy and its impact, Income distribution, redistribution and social security issues Fiscal & Budgetary Policy, Fiscal Federalism in India.	12
5	Case Studies in Expenditure Policy: Public Services A) National Defense B) Highways C) Outdoor Recreation D) Education	6

Books Recommended:

Reference Books:

1. Introduction to Public Policy by Charles Wheelan, W.W. Norton & Company.
2. Understanding Public Policy by Thomas R. Dye, Prentice Hall.
3. Public Policy-Making: An Introduction by Anderson J.E., Boston, Houghton.
4. Public Administration by Avasthi & Maheshwari, Lakshminarayan Agarwal, Agra.
5. New Horizons of Public Administration by Bhattacharya, Mohit, Jawahar Publishers, New Delhi.
6. Public Administration and Public Affairs by Henry, Nicholas, Prentice Hall of India, New Delhi.
7. Public Finance 10th Edition by Harvey S Rosen and Ted Gayer, McGraw-Hill Education, 2013.
8. Public Finance in Theory and Practice by Musgrave and Musgrave.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester, out of which one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Project Management				Course Code: DJ19ILO8021					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Pre-requisites: Basic concepts of Management.

Objectives:

1. To familiarize the students with the use of a structured methodology/approach for every unique project undertaken, utilizing project management concepts, tools and techniques.
2. To appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

Outcomes: On completion of the course, learner will be able to:

1. Explain project management life cycle and the various project phases as well as the role of project manager.
2. Apply selection criteria and select an appropriate project from different options.
3. Create a work break down structure for a project and develop a schedule based on it. Manage project risk strategically.
4. Use Earned value technique and determine & predict status of the project.
5. Capture lessons learned during project phases and document them for future reference.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Project Management Foundation: Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical) Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Introduction to project leadership, ethics in projects, Multicultural and virtual projects, Project management in various organization structures, PM knowledge areas as per Project Management Institute (PMI).	07
2	Initiating Projects: How to get a project started, selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter, Effective project team, Stages of team development & growth (forming, storming, norming & performing), team dynamics.	08
3	Project Planning: Work Breakdown structure (WBS) and linear responsibility chart, Project cost estimation and budgeting, Top down and bottoms up budgeting, Networking and Scheduling techniques, PERT, CPM, Crashing project time, Resource loading and levelling, Goldratt's critical chain, GANTT chart, Project Stakeholders and Communication plan, Introduction to Project Management Information System (PMIS). Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability and impact matrix. Risk response strategies for positive and negative risks.	12
4	Monitoring and Controlling Projects Planning monitoring and controlling cycle, Information needs and reporting, engaging with all stakeholders of the projects, communication and project meetings. Earned Value Management techniques for measuring value of work completed, using milestones for measurement, change requests and scope creep, Project audit. Project Contracting Project procurement management, contracting and outsourcing.	08
5	Closing the Project: Customer acceptance, Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report, doing a lessons learned analysis, acknowledging successes and failures.	07

Books Recommended:

Text books:

1. Project Management: A managerial approach, Jack Meredith & Samuel Mantel, 7th Edition, Wiley India.
2. Project Management: The Managerial Process, 6th edition, Erik Larson, Clifford Gray, McGraw Hill Education.

Reference Books:

1. A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 5th Ed, Project Management Institute PA, USA.
2. Project Management, Gido Clements, Cengage Learning.
3. Project Management, Gopalan, Wiley India.
4. Project Management, Dennis Lock, 9th Edition, Gower Publishing England.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Evaluation Scheme:

Semester End Examination (A):

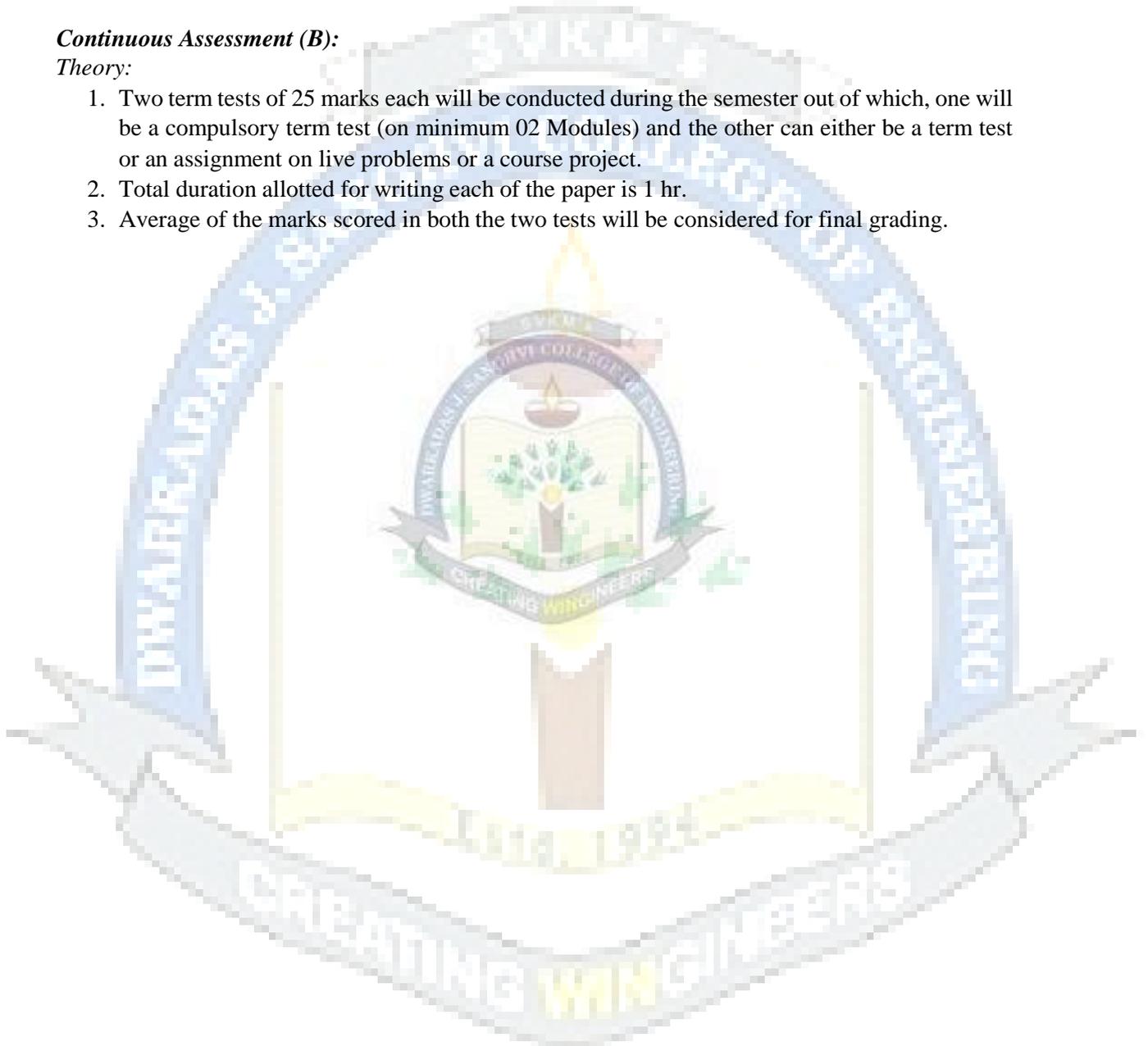
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Entrepreneurship Development and Management				Course Code: DJ19ILO8022					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Pre-requisites: Basic concepts of Management.

Objectives:

1. To develop entrepreneurial abilities by providing background information about support systems, skill sets, financial and risk covering institutions.
2. To appraise the students with the fundamentals that can help them to make right decisions for starting and running an enterprise.

Outcomes: On completion of the course, learner will be able to:

1. Develop idea generation, creative and innovative skills
2. Prepare a Business Plan
3. Compare different entrepreneur supporting institutions
4. Correlate suitable MSME scheme for an entrepreneur
5. Interpret financial and legal aspect of a business.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Entrepreneur & Entrepreneurship: Meaning of entrepreneur - Evolution of the concept - Functions of an Entrepreneur - Types of Entrepreneurs - Intrapreneur- an emerging class - Concept of Entrepreneurship - Evolution of Entrepreneurship - Development of Entrepreneurship - Entrepreneurial Culture - Stages in entrepreneurial process - Develop idea generation, creative and innovative skills	6
2	Business Planning Process: Meaning of business plan - Business plan process - Advantages of business planning - Marketing plan - Production/operations plan - Organization plan - Financial plan - Final Project Report with Feasibility Study - Preparing a model project report for starting a new venture.	10
3	Institutions Supporting Entrepreneurs: Small industry financing developing countries - A brief overview of financial institutions in India - Central level and state level institutions - SIDBI - NABARD - IDBI - SIDCO - Indian Institute of Entrepreneurship - District Industries Centers - Single Window System.	6
4	Micro, Small, and Medium Enterprises (MSMEs) MSMEs – Definition and Significance in Indian Economy; MSME Schemes, Challenges and Difficulties in availing MSME Schemes, Forms of Business; Make-In India, Start-Up India, Stand-Up India. Women Entrepreneurship; Rural Entrepreneurship; Family Business and First-Generation Entrepreneurs	8
5	Finance, Account, Costing and Legal Aspect of Business Funding new ventures – Conventional Source of Finance - bootstrapping, crowd sourcing- angel investors, VCs, debt financing , due diligence, Legal aspects of business (IPR, GST, Labour law)- Cost, volume, profit and break-even analysis - Margin of safety and degree of operating leverage - Capital budgeting for comparing projects or opportunities - Product costing- Product pricing- Introduction to financial statements - Profit & Loss statement - Balance sheet - Cash flow - Closure of Business	12

Books Recommended:

Reference Books:

1. Effective Entrepreneurial Management: Strategy, Planning, Risk Management, and Organization - by Robert D. Hisrich • Veland Ramadani, Springer Publication (2017)
2. Entrepreneurship- Theory, Process Practice –by Donald F. Kuratko, Cengage Learning (2014)
3. Entrepreneurship 6/E –by Robert D. Hisrich McGraw-Hill Education (India) (2011)
4. Entrepreneurship and small business- by Burns, P. New Jersey: Palgrave. (2001).
5. Innovation and entrepreneurship by Drucker. F. Peter, Harper business, (2006).
6. Entrepreneurship development small business enterprises, Poornima M Charantimath Pearson Publication (2013)
7. Entrepreneurial Development -Jayshree Suresh, Margham Publishers, Chennai
8. The Design of Business- by Martin Roger, Harvard Business Publishing (2009)
9. Entrepreneurship- by Roy Rajiv Oxford University Press (2011)

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Evaluation Scheme:

Semester End Examination (A):

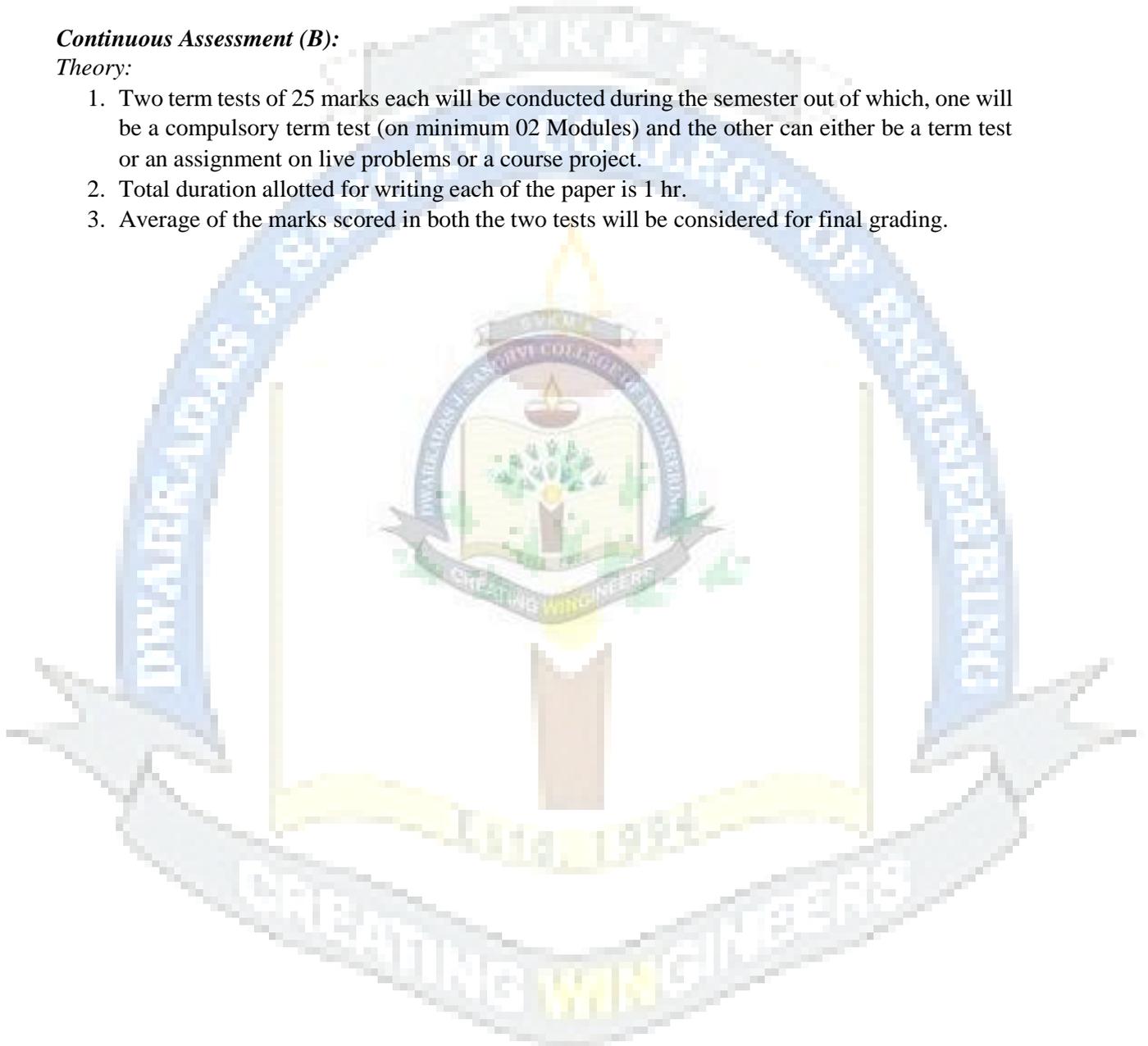
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Corporate Social Responsibility				Course Code: DJ19ILO8023					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
				--	--	--	--	--	--

Objectives:

1. To make students understand the concept, theories and application of CSR for the Development of the Society.

Outcomes: On completion of the course, learner will be able to:

1. Understand the key characteristics of Corporate Social Responsibility (CSR) in the context of present-day management.
2. Apprise regarding business decision-making which is informed by ethical values and respect for people communities and the environment.
3. Become aware of creating a strategic plan that enables an organization to reach out to its internal and external stakeholders with consistent messages.
4. Understand critical issues of Corporate Social Responsibility (CSR) in a cross-cultural setting

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Introduction to CSR Meaning and Definition, History of CSR, Concepts of Charity, Corporate philanthropy, Corporate Citizenship, Sustainability and Stakeholder Management. Environmental aspect of CSR Chronological evolution and Models of CSR in India Carroll's model Major codes on CSR Initiatives in India.	06
2	International framework for Corporate Social Responsibility Millennium Development Goals, Sustainable Development Goals, Relationship between CSR and MDGs. United Nations (UN) Global Compact 2011. UN guiding principles on business and human rights. OECD CSR policy tool, ILO tri-partite declaration of principles on multinational enterprises and social policy.	10
3	CSR-Legislation in India and the World Section 135 of Companies Act 2013.Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and Computation of Net Profit's Implementing Process in India.	10
4	The Drivers of CSR in India Market based pressure and incentives, civil society pressure, the regulatory environment in India Counter trends, Review of current trends and opportunities in CSR, Review of successful corporate initiatives and challenges of CSR. Case Studies of Major CSR Initiatives Corporate Social Responsibility and Public-Private Partnership (PPP)	08
5	Identifying key stakeholders of CSR Role of Public Sector in Corporate, government programs, Nonprofit and Local Self Governance in implementing CSR, Global Compact Self-Assessment Tool, National Voluntary Guidelines by Govt. of India, Roles and responsibilities of corporate foundations.	08

Books Recommended:

Text Books:

1. Corporate Social Responsibility in India, Sanjay K Agarwal, Sage Publications, 2008
2. Corporate Social Responsibility in India, Bidyut Chakrabarty, Routledge, New Delhi, 2015.

Reference Books:

1. Corporate Social Responsibility: An Ethical Approach, Mark S. Schwartz, Broadview Press, 2011
2. Attaining Sustainable Growth through Corporate Social Responsibility, George Pohle and Jeff Hittner, IBA Global Business Services, 2008
3. Strategic Corporate Social Responsibility: Stakeholders in a Global Environment, William B. Werther Jr. and David Chandler, 2nd Edition, Sage Publications, 2011

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Evaluation Scheme:

Semester End Examination (A):

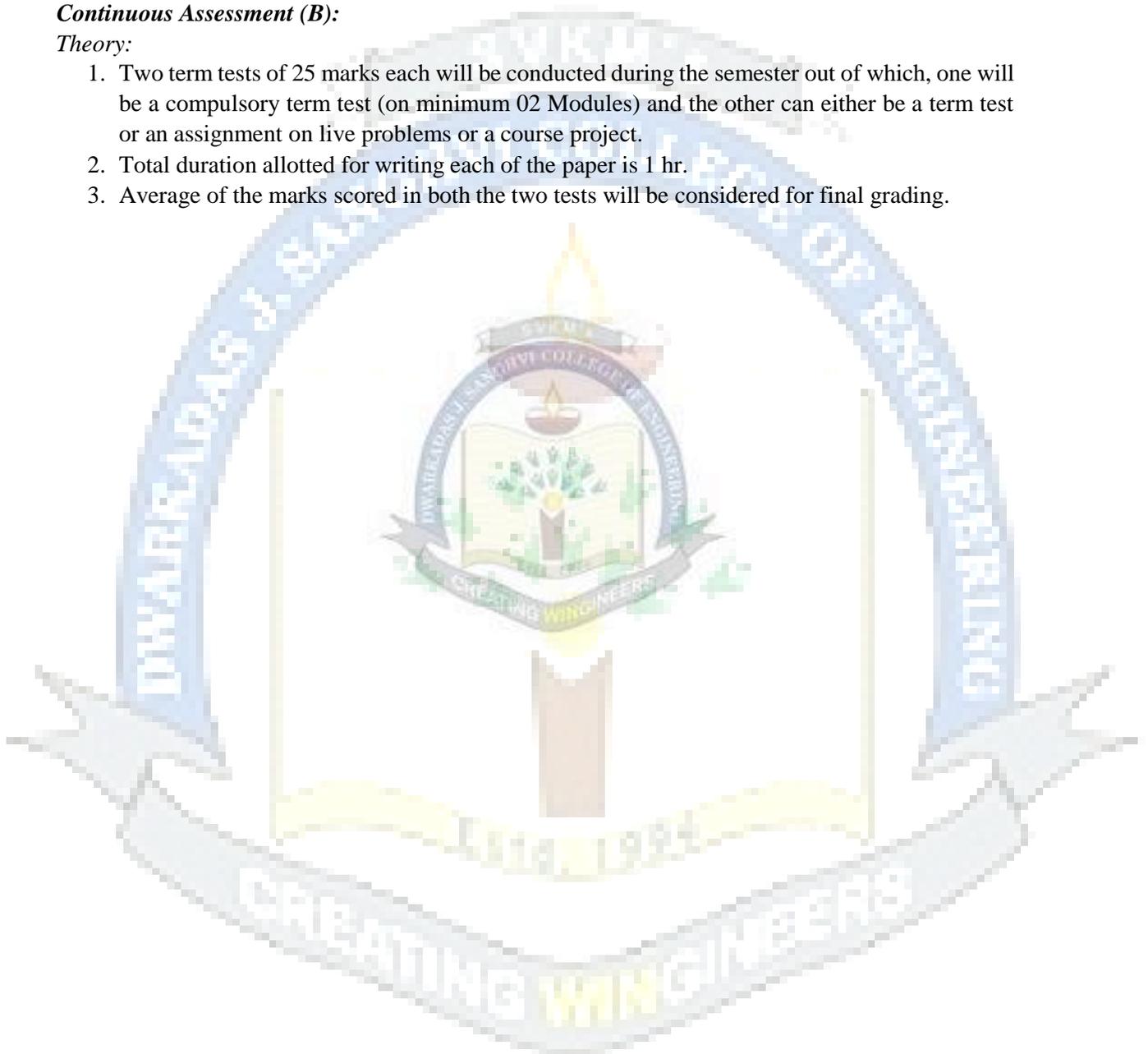
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Human Resource Management				Course Code: DJ19ILO8024					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. To introduce the students with basic concepts, techniques and practices of the human resource management.
2. To provide opportunity of learning Human resource management (HRM) processes, related with the functions, and challenges in the emerging perspective of today's organizations.
3. To familiarize the students about the latest developments, trends & different aspects of HRM.
4. To acquaint the student with the importance of inter-personal & inter-group behavioral skills in an organizational setting required for future stable engineers, leaders and managers.

Outcomes: On completion of the course, learner will be able to:

1. Understand the concepts, aspects, techniques and practices of the human resource management.
2. Understand the Human resource management (HRM) processes, functions, changes and challenges in today's emerging organizational perspective.
3. Gain knowledge about the latest developments and trends in HRM.
4. Apply the knowledge of behavioral skills learnt and integrate it with in inter personal and intergroup environment emerging as future stable engineers and managers.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<p>Introduction to HR Human Resource Management- Concept, Scope and Importance, Interdisciplinary Approach Relationship with other Sciences, Competencies of HR Manager, HRM functions. Human resource development (HRD): changing role of HRM – Human resource Planning, Technological change, Restructuring and rightsizing, Empowerment, TQM, Managing ethical issues.</p>	07
2	<p>Organizational Behaviour (OB) Introduction to OB Origin, Nature and Scope of Organizational Behaviour, Relevance to Organizational Effectiveness and Contemporary issues. Personality: Meaning and Determinants of Personality, Personality development, Personality Types, Assessment of Personality Traits for Increasing Self Awareness. Perception: Attitude and Value, Effect of perception on Individual Decision-making, Attitude and Behaviour. Motivation: Theories of Motivation and their Applications for Behavioural Change (Maslow, Herzberg, McGregor); Group Behaviour and Group Dynamics: Work groups formal and informal groups and stages of group development, Team Effectiveness: High performing teams, Team Roles, cross functional and self-directed team. Case study.</p>	08
3	<p>Organizational Structure & Design Structure, size, technology, Environment of organization; Organizational Roles & conflicts: Concept of roles; role dynamics; role conflicts and stress. Leadership: Concepts and skills of leadership, Leadership and managerial roles, Leadership styles and contemporary issues in leadership. Power and Politics: Sources and uses of power; Politics at workplace, Tactics and strategies.</p>	08
4	<p>Human resource Planning Recruitment and Selection process, Job-enrichment, Empowerment – Job Satisfaction, employee morale. Performance Appraisal Systems: Traditional & modern methods, Performance Counselling, Career Planning. Training & Development: Identification of Training Needs, Training Methods. Strategic HRM: Role of Strategic HRM in the modern business world, Concept of Strategy, Strategic Management Process, Approaches to Strategic Decision Making; Strategic Intent – Corporate Mission, Vision, Objectives and Goals.</p>	09
5	<p>Labor Laws & Industrial Relations: Evolution of IR, IR issues in organizations, Overview of Labor Laws in India; Industrial Disputes Act, Trade Unions Act, Shops and Establishments Act. Emerging Trends in HR Organizational development; Business Process Re-engineering (BPR), BPR as a tool for organizational development, managing processes & transformation in HR. Organizational Change, Culture, Environment.</p>	10

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

	Cross Cultural Leadership and Decision Making: Cross Cultural Communication and diversity at work, Causes of diversity, managing diversity with special reference to handicapped, women and ageing people, intra company cultural difference in employee motivation.	
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Books Recommended:

Reference Books:

1. Stephen Robbins, Organizational Behavior, 16th Ed, 2013
2. V S P Rao, Human Resource Management, 3rd Ed, 2010, Excel publishing
3. Aswathapa, Human resource management: Text & cases, 6th edition, 2011
4. C. B. Mamoria and S V Gankar, Dynamics of Industrial Relations in India, 15th Ed, 2015, Himalaya Publishing, 15th edition, 2015
5. P. Subba Rao, Essentials of Human Resource management and Industrial relations, 5th Ed, 2013, Himalaya Publishing
6. Laurie Mullins, Management & Organizational Behavior, Latest Ed, 2016, Pearson Publications

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Corporate Finance Management				Course Code: DJ19ILO8025					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination		Term work			Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. Overview of Indian financial system, instruments and market.
2. Basic concepts of value of money, returns and risks, corporate finance, working capital and its management.
3. Knowledge about sources of finance, capital structure, dividend policy.

Outcomes: On completion of the course, learner will be able to:

1. Understand Indian finance system.
2. Apply concepts of time value money and risk returns to product, services and business.
3. Understand corporate finance; evaluate and compare performance of multiple firms.
4. Take Investment, finance as well as dividend decisions.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Overview of Indian Financial System: Characteristics, Components and Functions of Financial System. Financial Instruments: Meaning, Characteristics and Classification of Basic Financial Instruments — Equity Shares, Preference Shares, Bonds-Debentures, Certificates of Deposit, and Treasury Bills. Financial Markets: Meaning, Characteristics and Classification of Financial Markets — Capital Market, Money Market and Foreign Currency Market Financial Institutions: Meaning, Characteristics and Classification of Financial Institutions — Commercial Banks, Investment-Merchant Banks and Stock Exchanges	07
2	Overview of Corporate Finance: Objectives of Corporate Finance; Functions of Corporate Finance—Investment Decision, Financing Decision, and Dividend Decision. Financial Ratio Analysis: Overview of Financial Statements: -Balance Sheet, Profit and Loss Account, and Cash Flow Statement; Purpose of Financial Ratio Analysis; Liquidity Ratios; Efficiency or Activity Ratios; Profitability Ratios; Capital Structure Ratios; Stock Market Ratios; Limitations of Ratio Analysis	09
3	Concepts of Returns and Risks: Measurement of Historical Returns and Expected Returns of a Single Security and a Two-security Portfolio; Measurement of Historical Risk and Expected Risk of a Single Security and a Two-security Portfolio. Time Value of Money: Future Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Present Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Continuous Compounding and Continuous Discounting.	07
4	Working Capital Management: Concepts of Meaning Working Capital; Importance of Working Capital Management; Factors Affecting an Entity's Working Capital Needs; Estimation of Working Capital Requirements; Management of Inventories; Management of Receivables; and Management of Cash and Marketable Securities. Capital Budgeting: Meaning and Importance of Capital Budgeting; Inputs for Capital Budgeting Decisions; Investment Appraisal Criterion—Accounting Rate of Return, Payback Period, Discounted Payback Period, Net Present Value(NPV), Profitability Index, Internal Rate of Return (IRR), and Modified Internal Rate of Return (MIRR)	10
5	Capital Structure: Factors Affecting an Entity's Capital Structure; Overview of Capital Structure Theories and Approaches— Net Income Approach, Net Operating Income Approach; Traditional Approach, and Modigliani-Miller Approach. Relation between Capital Structure and Corporate Value; Concept of Optimal Capital Structure Dividend Policy: Meaning and Importance of Dividend Policy; Factors Affecting an Entity's Dividend Decision; Overview of Dividend Policy Theories and Approaches— Gordon's Approach, Walter's Approach, and Modigliani-Miller Approach	09

Books Recommended:

Reference Books:

1. Fundamentals of Financial Management, 13th Edition (2015) by Eugene F. Brigham and Joel F. Houston; Publisher: Cengage Publications, New Delhi.
2. Analysis for Financial Management, 10th Edition (2013) by Robert C. Higgins; Publishers: McGraw Hill Education, New Delhi.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

3. Indian Financial System, 9th Edition (2015) by M. Y. Khan; Publisher: McGraw Hill Education, New Delhi.
4. Financial Management, 11th Edition (2015) by I. M. Pandey; Publisher: S. Chand (G/L) & Company Limited, New Delhi.
5. Financial Management, Theory & Practice 8th Edition (2011), by Prasanna Chandra: Tata McGraw Hill Education Private Limited, New Delhi.

Evaluation Scheme:

Semester End Examination (A):

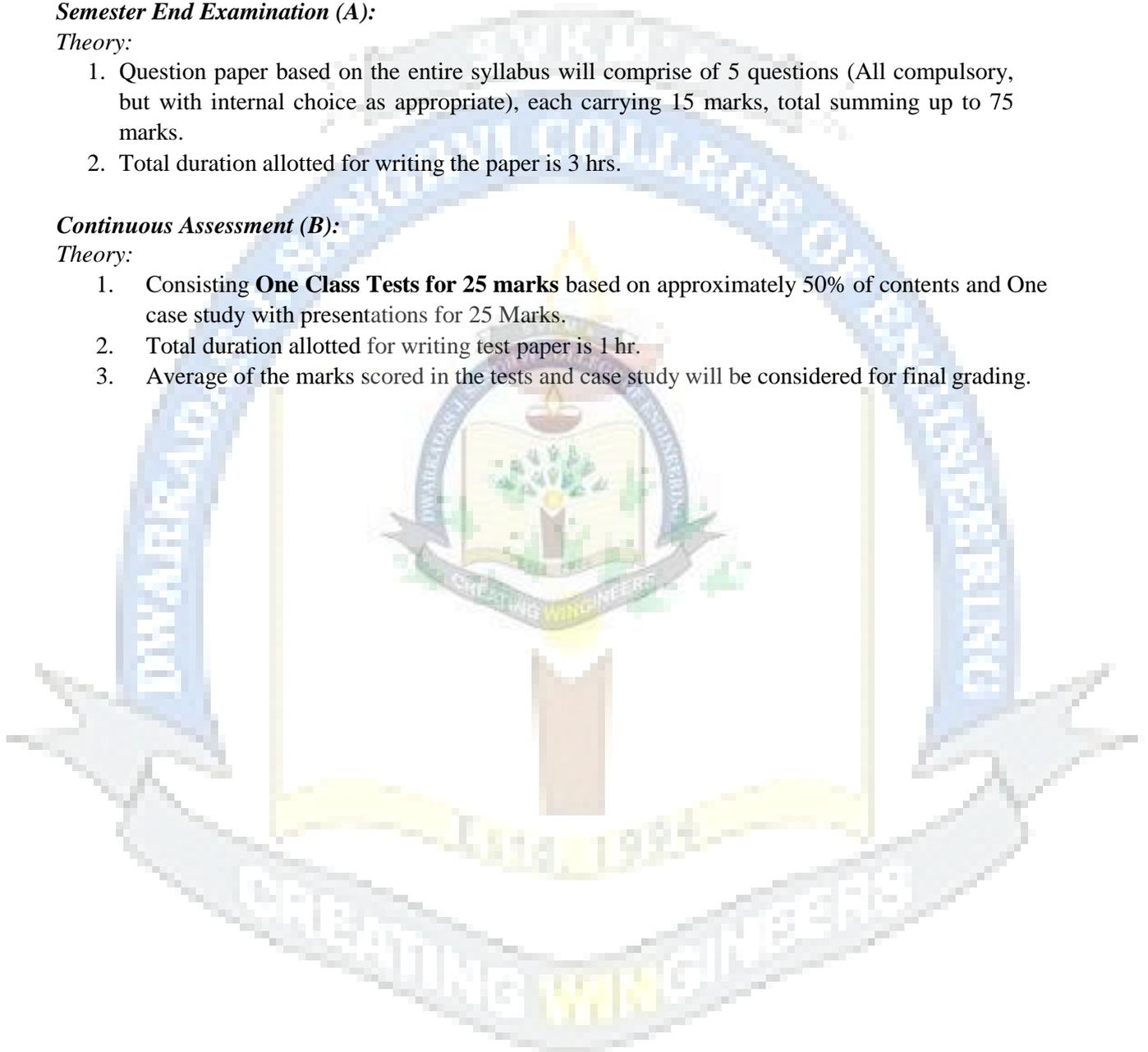
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Consisting **One Class Tests for 25 marks** based on approximately 50% of contents and One case study with presentations for 25 Marks.
2. Total duration allotted for writing test paper is 1 hr.
3. Average of the marks scored in the tests and case study will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Logistic and Supply Chain Management				Course Code: DJ19ILO8026					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination		Term work			Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. To acquaint with the concept of key drivers of supply chain performance and their inter-relationships with strategy.
2. To acquaint with the design problems and develop an understanding of information technology in supply chain optimization.
3. To acquaint with the complexity of inter-firm and intra-firm coordination in implementing programs such as e-collaboration, quick response, jointly managed inventories and strategic alliances.

Outcomes: On completion of the course, learner will be able to:

1. Demonstrate the functional strategy map of supply chain management.
2. Analyze the determinants of Supply Chain and Transportation networks design.
3. Demonstrate the need of coordination and sourcing decisions in supply chain.
4. Understand pricing, revenue management and role of IT in supply chain.
5. Understand various sustainability aspects of a supply chain.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<p>Understanding the Supply Chain: Objective, Importance, Decision Phases, Process Views.</p> <p>Achieving Strategic Fit and Scope: Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope, Challenges to Achieving and Maintaining Strategic Fit.</p> <p>Supply Chain Drivers and Metrics: Financial Measures of Performance, Drivers of Supply Chain Performance, Framework for Structuring Drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing.</p> <p>Creating the Responsive Supply Chain: Product push versus demand pull, The Japanese philosophy, The foundations of agility, A route-map to responsiveness.</p>	08
2	<p>Designing the Supply Chain and Transportation Networks</p> <p>Designing Distribution Networks: The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Design Options for a Distribution Network.</p> <p>Network Design in the Supply Chain: The Role of Network Design in the Supply Chain, Factors Influencing Network Design Decisions, Framework for Network Design Decisions, Models for Facility Location and Capacity Allocation.</p> <p>Designing Global Supply Chain Networks: The Impact of Globalization on Supply Chain Networks, The Offshoring Decision: Total Cost, Risk Management in Global Supply Chains, Discounted Cash Flows, Evaluating Network Design Decisions Using Decision Trees.</p> <p>Transportation in a Supply Chain: The Role of Transportation in a Supply Chain, Modes of Transportation and their Performance Characteristics, Design Options for a Transportation Network, Trade-Offs in Transportation Design, Tailored Transportation.</p>	14
3	<p>Coordination in a Supply Chain: Lack of Supply Chain Coordination and the Bullwhip Effect, The Effect on Performance of Lack of Coordination, Obstacles to Coordination in a Supply Chain, Managerial Levers to Achieve Coordination, Continuous Replenishment and Vendor-Managed Inventories, Collaborative Planning, Forecasting, and Replenishment.</p> <p>Sourcing Decisions in a Supply Chain: The Role of Sourcing in a Supply Chain, In-House or Outsource, Third- and Fourth-Party Logistics Providers, Using Total Cost to Score and Assess Suppliers, Supplier Selection—Auctions and Negotiations, Contracts, Risk Sharing and Supply Chain Performance, Design Collaboration, The Procurement Process.</p>	07

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

4	<p>Pricing and Revenue Management in a Supply Chain: The Role of Pricing and Revenue Management in a Supply Chain, Pricing and Revenue Management for Multiple Customer Segments, Pricing and Revenue Management for Perishable Assets, Pricing and Revenue Management for Seasonal Demand, Pricing and Revenue Management for Bulk and Spot Contracts.</p> <p>Information Technology in a Supply Chain: The Role of IT in a Supply Chain, The Supply Chain IT Framework, Customer Relationship Management, Internal Supply Chain Management, Supplier Relationship Management, The Transaction Management Foundation, Managing the supply chain as a network, Seven major business transformations, From 3PL to 4PL. The Future of IT in the Supply Chain.</p>	08
5	<p>Creating a Sustainable Supply Chain: The Role of Triple Bottom Line, Key Metrics for Sustainability, Greenhouse gases and the supply chain, Reducing the transport-intensity of supply chains, Beyond the carbon footprint, Reduce, reuse, recycle, Sustainability and Supply Chain Drivers.</p> <p>Introduction to the Supply Chain of the Future: Emerging Megatrends.</p>	05

Books Recommended:

Reference Books:

1. Logistics & Supply Chain Management, Martin Christopher, Pearson Education Limited, 2016.
2. Supply Chain Management Strategy, Planning, and Operation, Sunil Chopra and Peter Meindl, Pearson, 2016.
3. Essentials of Supply Chain Management, Michael H. Hugos, Wiley, 2018.
4. Supply Chain Management For Dummies, Daniel Stanton, Wiley, 2020.
5. Global Supply Chain and Operations Management A Decision-Oriented Introduction to the Creation of Value, Dmitry Ivanov, Alexander Tsipoulanidis and Jörn Schönberger, Springer International Publishing, 2016.
6. Supply Chain Management, Sinha, McGraw-Hill Education (India) Pvt Limited, 2012.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII						
Course: IPR and Patenting				Course Code: DJ19ILO8027						
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
								75		
				Laboratory Examination			Term work		Total Term work	--
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal		
3	--	--	3	--	--	--	--	--	--	--

Objectives:

1. Understanding, defining and differentiating different types of intellectual properties (IPs)
2. Assessing different IP management (IPM) approaches
3. Exposure to the Legal management of IP and understanding of real life practice of IPM.

Outcomes: On completion of the course, learner will be able to:

1. Recognize the crucial role of IP for the purposes of product and technology development.
2. Understand how and when to file a patent
3. Apply the knowledge to understand the entire ecosystem
4. Derive value from IP and leverage its value in new product and service development

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<p>Concept of Intellectual Property Law Idea/Expression dichotomy, Introduction and the need for intellectual property right (IPR), Intellectual Property laws, IPR in India: Genesis and development, IPR abroad, Major International Instruments concerning Intellectual Property Rights: Paris Convention, the Berne Convention, the Universal Copyright Convention, the WIPO Convention, the Patent Cooperation Treaty, the TRIPS Agreement, incentive theory, types of IPR, India's New National IP Policy, 2016, Govt. Schemes in IPR IP</p>	06
2	<p>Patents and Trademarks Elements of Patentability: Novelty, Non Obviousness, Industrial Application, Non Patentable Subject Matter, Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties, Patent office and Appellate Board, Case study of existing patents related to software, healthcare, devices Concept of Trademarks, Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks), Non Registrable Trademarks, Registration of Trademarks, Rights of holder and assignment and licensing of marks, Infringement, Remedies & Penalties, Trademarks registry and appellate board</p>	12
3	<p>Copyrights and Design Copyrights: Nature, Subject matter: original literary, dramatic, musical, artistic works, cinematograph films and sound recordings, Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright, Infringement, Remedies & Penalties, Related Rights, distinction between related rights and copyrights Design: meaning and concept of novel and original, procedure for registration, effect of registration and term of protection</p>	10
4	<p>GI, PVP and LDP Geographical indication: meaning, difference between GI and trademarks, procedure for registration, effect of registration and term of protection Plant variety protection: meaning, benefit sharing, farmers' rights, procedure for registration, effect of registration and term of protection Layout Design protection: meaning, procedure for registration, effect of registration, term of protection</p>	08
5	<p>Beyond IP Introduction to Competition Law: concept of competition, relationship and Interaction between IPR and competition law, IP and competition issues, Technology transfer agreements. EU experience with IP and Competition Law, Indian Competition Act and IPR protection, IPR issues in merger and acquisition, harmonization of IP protection and competition Law in India</p>	06

Books Recommended:

Reference Books:

1. Feroz Ali, The Law of Patents, LexisNexis
2. Ronald D. Slusky, Invention Analysis and Claiming – A Patent Lawyer's Guide, Second Edition, American Bar Association, 2012.
3. Feroz Ali, The Touchstone Effect – The Impact of Pre-grant Opposition on Patents, LexisNexis, 2009.

Syllabus for Final Year of B.Tech. (Common for All Programs)
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4. Innovation and entrepreneurship by Drucker. F. Peter, Harper business, (2006).
5. Intellectual Property Rights, Deborah. E. Bouchoux, Cengage Learning.
6. Intellectual Property Rights– Unleashmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,
7. The Design of Business- by Martin Roger, Harvard Business Publishing (2009)

Evaluation Scheme:

Semester End Examination (A):

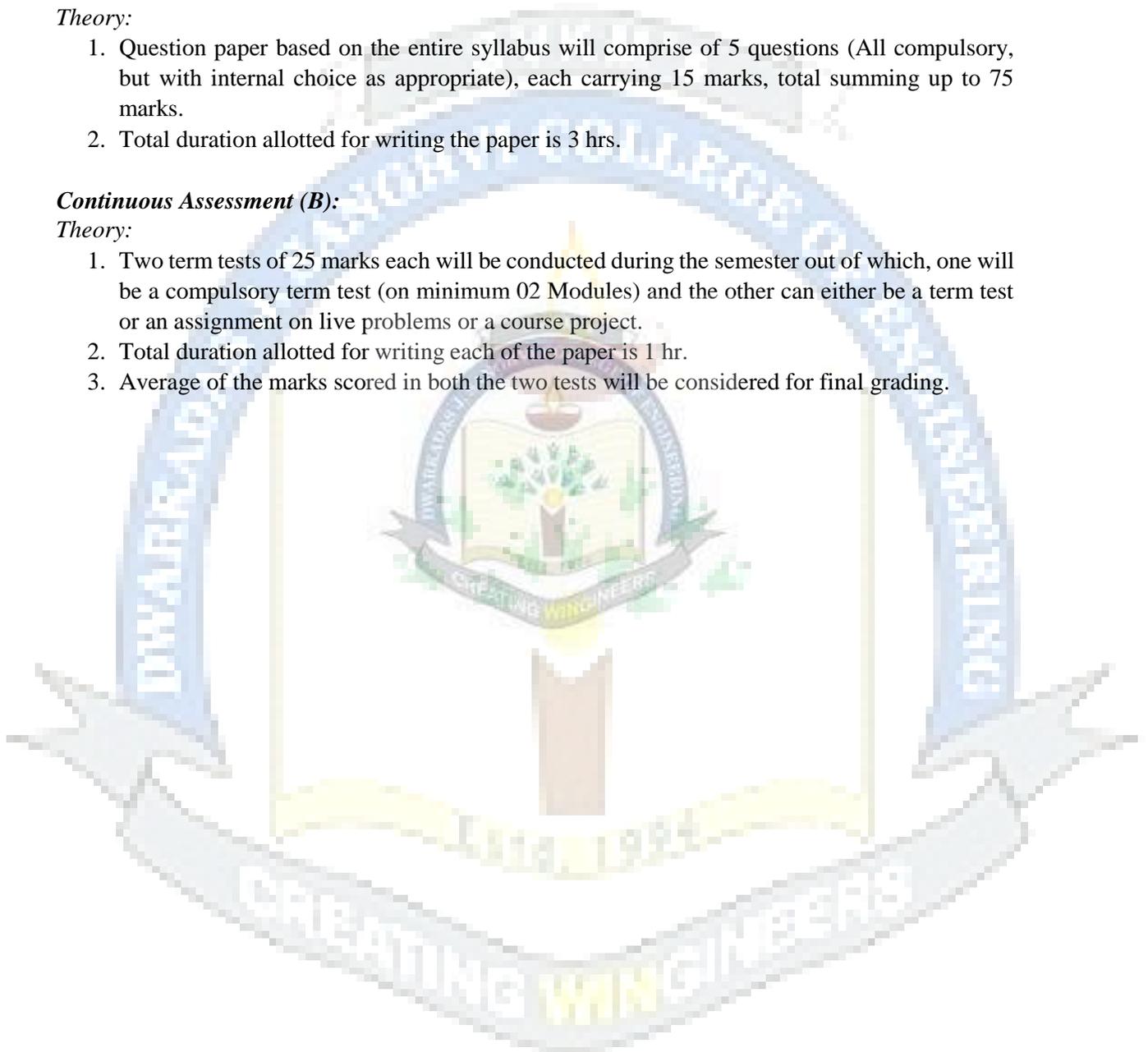
Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Digital Marketing Management				Course Code: DJ19ILO8028					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
				--	--	--	--	--	--

Objectives:

1. To explain the evolution of digital marketing and outline the underlying technology and frameworks within which digital marketing operates.
2. To understand digital marketing business models elucidating on the six core digital value elements and how they can be used to generate customer value.
3. To understand the key concepts of developing strategy for digital business and the emerging business structures.
4. To plan the digital marketing strategy roadmap, its four key stages and their elements and understand the 6S Digital Marketing Implementation Stages.
5. To understand digital marketing planning & operations setup.
6. To explain the implementation of search campaigns which include Search Engine Marketing (SEM) and Search Engine Optimization (SEO) concepts.
7. To explain upcoming digital marketing concepts including Big Data and Internet of Things (IoT), Small and Medium Businesses (SMB), B2B marketing and Social, Local and Mobile (SoLoMo) concept.

Outcomes: On completion of the course, learner will be able to:

1. Understand the digital marketing framework & model and consumer behaviour.
2. Develop digital marketing strategy roadmap.
3. Explain the terminology and concepts for developing web-specific media plans.
4. Understand concepts related to digital campaign management and revenue generation models.
5. Get a perspective on global digital marketing technology/tools and future trends.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<p>Introduction to Digital Marketing Emergence of Digital Marketing as a tool, media consumption drivers for new marketing environment, applications and benefits of digital marketing.</p> <p>Digital Marketing Framework Delivering enhanced customer value, market opportunity analysis and digital services development, ASCOR framework, critical success factors for digital marketing.</p> <p>Digital Marketing Models Creation Factors impacting digital marketplace, value chain digitization, business models.</p> <p>The Consumer for Digital Marketing Consumer behavior on the internet, evolution of consumer behavior models, managing consumer demand, integrated marketing communications (IMC), impact of digital channels on IMC.</p>	08
2	<p>Digital marketing Strategy Development Elements of assessment phase, macro-micro environmental analysis, marketing situation analysis.</p> <p>Digital Marketing Internal Assessment and Objectives Planning Analyzing present offerings mix, marketing mix, core competencies analysis and internal resource mapping. Digital presence analysis, digital marketing objectives development and review.</p> <p>Digital Marketing Strategy Definition Understanding digital business strategy and structures, consumer development strategy, offering mix for Digital, digital pricing models, managing promotional channels and developing the extended Ps- People, process, programs and performance.</p> <p>Digital marketing Strategy Roadmap Developing digital marketing strategy roadmap, the 6s digital marketing implementation strategy, marketing across the product life cycle.</p>	13
3	<p>Digital Marketing Planning and Setup Understanding digital media planning terminology and stages, steps to creating marketing communications strategy, introduction to search marketing, display marketing, social media marketing.</p> <p>Digital Marketing Operations Setup Basics of lead generation and conversion marketing, website content development and management, elements of user experience, web usability and evaluation.</p>	08
4	<p>Digital marketing Execution Basic elements of digital campaign management, search execution, display execution, social media execution, content marketing.</p> <p>Digital marketing Execution Elements Digital revenue generation models, managing service delivery and payments, managing digital implementation challenges like e commerce, internal & external and consumer specific challenges.</p>	08

Syllabus for Final Year of B.Tech. (Common for All Programs)
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(Academic Year 2022-2023)

5	Digital Business – Present and Future Digital Marketing – Global Landscape, digital marketing overview – global spend, advertising spend, and technology/tools landscape. Data technologies (Big data and IOT) impacting marketing, segment based digital marketing and SoLoMo – the next level of hyperlocal marketing.	05
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Books Recommended:

Reference Books:

1. Fundamentals of Digital Marketing by Puneet Singh Bhatia, Pearson Education Limited,
2. Digital Marketing by Seema Gupta- McGraw Hill Education.
3. Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing by Dave Chaffey and P. R. Smith, 5th edition, Taylor & Francis.
4. Digital Marketing: Strategy, Implementation and Practice- 6th edition by Dave Chaffey Fiona Ellis-Chadwick, Pearson Education Limited,
5. Digital marketing by Vandana Ahuja, Oxford University Press.
6. The Art of Digital Marketing by Ian Dodson, John Wiley & Sons.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Environmental Management				Course Code: DJ19ILO8029					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Pre-requisite: Knowledge of environmental science.

Objectives:

1. Understand and identify environmental issues relevant to India and global concerns
2. Learn concepts of ecology
3. Familiarise environment related legislations
4. Understand Environmental Auditing Procedures.

Outcomes: On completion of the course, learner will be able to:

1. Identify Environmental issues and get familiarized to the concept of Ecosystem and environmental management.
2. Know policies and legal aspects and understand EM system standards.
3. Understand Environment Impact assessment.
4. Understand Environment Auditing procedures.
5. Describe Environmental management Techniques

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Principles of Environmental management (EM): Introduction of EM, Definition, Ecosystem concept, Participants in EM, Ethics and the environment, International Environmental Movement, Environmental issues relevant to India.	08
2	Policy and Legal Aspects of EM: - Introduction to various Environmental Policies, Indian and International Environmental laws and legislation. EM system Standards: - Core Elements, Benefits, Certification Body Assessment & Documentation for EMS, ISO- 14000 Standards.	10
3	Environmental Impact Assessment (EIA) :- Purpose, steps, hierarchy of EIA, Environmental Impact Statement and Impact Indicators, Evolution of IA in India and worldwide. Preliminary stages of EIA, Impact, Prediction, Evaluation and Mitigation.	10
4	Environmental Auditing (EA):- Objectives, Scope and Types of EA, Audit Methodology, Elements of Audit Process, Auditing of EMS.	06
5	Environmental Management Techniques: - Environmental Monitoring and Modelling, Environmental technology Assessment and Environmental Risk Assessment, Eco-mapping.	08

Books Recommended:

Text Books:

1. Environmental Management, T V Ramachandra and Vijay Kulkarni, TERI Press
2. Environmental Management: Principles and Practice, C J Barrow, Routledge Publishers London, 1999

Reference Books:

1. A Handbook of Environmental Management Edited by Jon C. Lovett and David G. Ockwell, Edward Elgar Publishing
2. Indian Standard Environmental Management Systems — Requirements with Guidance for Use, Bureau Of Indian Standards, February 2005
3. Environmental Management: An Indian Perspective, S N Chary and Vinod Vyasulu, Macmillan India, 2000
4. Introduction to Environmental Management, Mary K Theodore and Louise Theodore, CRC Press
5. Environment and Ecology, Majid Hussain, 3rd Ed. Access Publishing.2015

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Program: Final Year (Common for All Programs)				Semester: VIII					
Course: Labour and Corporate Law				Course Code: DJ19ILO8030					
Teaching Scheme (Hours / week)				Evaluation Scheme					Total marks (A+ B)
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	--	--	3	--	--	--	--	--	--

Objectives:

1. To understand the development and judicial setup of Labour Laws.
2. To learn the laws relating to Industrial Disputes, Social Security and Working conditions.
3. To analyse the laws related to corporate governance in different settings.
4. To develop awareness of legal principles involved in economic relationships and business transactions.
5. To develop an understanding of free enterprise system and legal safeguards of the same.

Outcomes: On completion of the course, learner will be able to:

1. Illustrate the role of trade union in the industrial setup.
2. Understand the important causes, impact of industrial disputes and settlement procedures.
3. To provide in-depth understanding of corporate social responsibility.
4. Apply concepts, principles and theories to understand simple business laws.
5. Analyse the principle of international business and strategies adopted by firms to expand globally

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Trade Unions and Collective Bargaining: Trade Unionism in India, Definition of Trade Union and Trade Dispute, General and Political Funds of Trade Union, Civil and Criminal Immunities of Registered Trade Unions, Recognition of Trade Union, Collective Bargaining	9
2	Industrial Dispute and Instruments of Economic Coercion: Industrial Dispute and Individual Dispute, Settlement of Industrial Dispute. Concept of strike – Gherao, Bandh and Lock-out, Types of Strike Rights to Strike and Lock-out	8
3	Formation of a Company and Corporate governance: Company and Other Forms of Business Organizations, Different Kinds of Company: One Person Company, Foreign Company. Kinds of Company Meetings and Procedure Powers, Duties and Kinds of Director: Independent Director, Women Director Different Prevention of Oppression and Mismanagement Investor Protection, Insider Trading, Corporate Fraud.	9
4	Corporate Social Responsibility and Corporate Liquidation: Evolution of Corporate Social Responsibility, Corporate Criminal liability, Corporate Environmental Liability Different Types of Winding up of Company, Role of Courts in Winding up of Company Merger and Acquisition of Company, Cross Border Merger, Takeover Code: Role of SEBI	8
5	Case Studies on A) Labour law B) Labour relations C) Corporate laws D) Securities laws	8

Books Recommended:

Reference Books:

1. Surya Narayan Misra, An Introduction to Labour and Industrial Law, Allahabad Law Agency, 1978
2. Indian Law Institute, Cases and Materials on Labour Law and Labour Relations
3. P.L. Malik, Industrial Law, Eastern Book Company, 2013
4. S.C. Srivastava, Industrial Relations and Labour Law, Vikas Publishing House, New Delhi
5. C.A. Kamal Garg, Bharat's Corporate and Allied Laws, 2013.
6. Institute of Company Secretaries of India, Companies Act 2013, CCH Wolter Kluwer Business, 2013
7. Saleem Sheikh & William Rees, Corporate Governance & Corporate Control, Cavendish Publishing Ltd., 1995
8. Taxmann, A Comparative Study of Companies Act 2013 and Companies Act 1956

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VIII (Autonomous)
(Academic Year 2022-2023)

2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

