SEMESTER 7

INDUSTRIAL ENGINEERING

SEMESTER S7

MANAGEMENT ACCOUNTING FOR ENGINEERS

Course Code	PEIET741	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To enable the students to understand the concepts of management accounting and its importance in organisations.
2. To apply various tools and techniques to ascertain the financial condition of organizations.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Basics of accounting**: Management Accounting, Financial accounting, Cost accounting, comparison of financial accounting, cost accounting and management accounting, generally accepted accounting principles, accounting standards, accounting cycle, construction of journals and ledgers.	9
2	**Financial accounting**: Salient features of balance sheet and profit and loss statement, cash flow and fund flow analysis, limitations of cash flow and fund flow statements, working capital management, ratio analysis - types, computation and interpretation of financial ratios. Depreciation-definition and methods.	9
3	**Cost accounting systems**: Cost concepts relating to income measurement and profit planning, cost concepts for control and decision making, job costing, process costing, allocation of overheads, activity-based costing, standard costing and variance analysis, marginal costing, cost - volume-profit analysis.	9
4	**Budgeting systems**: Introduction, planning process, budget - definition, meaning and purpose, requirements for a sound budget, operating budgets, financial budgets, flexible budgets, zero based budgets and budgetary control, construction of various budgets.	9

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain fundamental concepts of accounting principles and construct preliminary accounts.	**K3**
CO2	Apply techniques of accounting principles to prepare financial statements.	**K3**
CO3	Apply cost accounting concepts for managerial decision making.	**K3**
CO4	Construct various types of budgets for planning and decision making in organisations.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	-	3	-	-	-	-	-	3	2
CO2	2	3	2	-	3	-	-	-	-	-	3	2
CO3	2	3	2	-	3	-	-	-	-	-	3	2
CO4	2	3	2	-	3	-	-	-	-	-	3	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Management Accounting	M. Y. Khan, P. K. Jain	McGraw Hill	8th Edition, 2021
2	Management Accounting	Gupta S.K., Sharma R. K.	Kalyani Publishers	14th Edition, 2018

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Introduction to Management Accounting	Horngren, Sundem, Stratton, Burgstahler, Schatzberg	PHI Learning	16th Edition, 2013
2	Financial accounting - A Managerial Perspective	Narayanaswamy R.	PHI Learning	6th Edition, 2017
3	Financial and Managerial accounting - The basis for business decisions	Jan Williams	Tata McGraw Hill	16th Edition, 2017
4	Fundamental of Financial Management	James C., Van Horne	Pearson Education	13th Edition, 2015

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/101/110101003/

SEMESTER S7

FINANCIAL TIME SERIES ANALYSIS

Course Code	**PEIET742**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To enable students to develop linear models for time series analysis.
2. To equip students to model and predict financial market behaviors using time series analysis.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Linear time series models:** Financial data and their properties, financial time series and their characteristics, means, variances, covariances, correlation and autocorrelation, correlogram, stationarity, trends, seasonal variation, univariate and multivariate data, decomposition of series, the spectral density, smoothing and filtering, white noise, autoregressive models, moving average models, ARMA and ARIMA models.	**9**
2	**Conditional heteroscedastic models:** Characteristics of volatility, ARCH model, GARCH model, GARCH-M model, EGARCH model, threshold GARCH model, CHARMA model, random coefficient autoregressive model, asymmetric power ARCH model, nonsymmetric GARCH model, stochastic volatility model, long-memory stochastic volatility model, applications.	**9**
3	**Nonlinear time series and nonparametric models**: Nonlinear time series, univariate parametric nonlinear models - general formulation, threshold autoregressive models, Markov switching models, smooth transition autoregressive models, time-varying coefficient models. Univariate nonparametric models - kernel smoothing, local conditional mean, local polynomial fitting, splines, wavelet smoothing, nonlinear additive models, index model and sliced inverse regression.	**9**

4	**High frequency financial data:** Nonsynchronous trading, bid-ask spread of trading prices, empirical characteristics of trading data, models for price changes, duration models, value at risk (VaR), risk metrics, extreme value theory. **Multivariate linear time series:** Stationary vector autoregressive time series, vector autoregressive moving average time series. **Multivariate volatility models:** Multivariate GARCH models, GARCH models for bivariate returns, higher dimensional volatility models, factor-volatility models, multivariate t distribution.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes		Bloom's Knowledge Level (KL)
CO1	Develop, estimate, and critically evaluate suitable linear time series models to forecast time series data.	**K3**
CO2	Develop conditional heteroscedastic models for various applications.	**K3**
CO3	Apply nonlinear time series models and nonparametric estimation techniques.	**K3**
CO4	Develop multivariate time series and volatility models.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**2**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**2**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	An Introduction to Analysis of Financial Data with R	Ruey S. Tsay	John Wiley & Sons, Inc.	1st Edition, 2014
2	Nonlinear Time Series Analysis	Ruey S. Tsay, Rong Chen	John Wiley & Sons, Inc.	1st Edition, 2018
3	Multivariate time series analysis: with R and financial applications	Ruey S. Tsay	John Wiley & Sons, Inc.	1st Edition, 2013

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Statistics and Data Analysis for Financial Engineering with R examples	David Ruppert, David S. Matteson	Springer	2nd Edition, 2015
2	Time Series Analysis: Univariate and Multivariate Methods	William W. S. Wei	Pearson	2nd Edition, 2005
3	Time Series Analysis and its Applications with R examples	Robert H. Shumway, David S. Stoffer	Springer	2rd Edition, 2011
4	Time Series for Data Science: Analysis and Forecasting	Wayne A. Woodward, Bivin P. Sadler, Stephen D. Robertson	CRC Press	1st Edition, 2024

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/103/106/103106123/

SEMESTER S7

FINANCIAL MANAGEMENT

Course Code	PEIET743	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To enable for applying techniques of financial decisions, sources, and analysis.
2. To enable for applying tools of capital structure and working capital management.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Financial management:** Introduction to finance and financial management. Scope of financial management, objectives of financial management, nature of financial management, goal of financial management, and financial management decisions. Time value of money - basic computations using compounding and discounting techniques. Major financial decision areas - factors influencing financial decisions, internal and external factors. Financial risk and return concepts. Methods for profit and wealth maximizations.	9
2	**Financial sources:** Identification of major financial sources - long term sources of finance - equity shares, debentures, preferred stock. Short term sources - bank sources, trade credit, overdrafts, commercial papers, money markets and mutual funds. **Financial statement and analysis:** Introduction concepts of financial accounting, financial statements, and financial analysis. Major financial statements - income statement, balance sheet, fund flow statement and cash flow statement. Ratio analysis - balance sheet ratios, income statement ratios, cash flow statement ratios, leverage ratios and composite ratios.	9
3	**Capital structure decisions and theories:** Capital structure - meaning, scope and patterns of capital structure, capital structure decisions, cost of	9

	capital - cost of specific sources of capital. Measurement of cost of capital - weighted average cost of capital. Capital structure theories / approaches - net income approach, net operating income approach, traditional approach, and Modigliani-Miller (MM) approach. Planning of domestic and international sources of finance.	
4	**Working capital decisions and management:** Working capital - working capital planning, working capital decisions, working capital management. theoretical models of cash management, inventories (including risk analysis), trade receivables, trade payables and short-term financing. Operating cycles. Capital budgeting - conventional and discounted cash flow (DCF) methods. Decision criteria in capital budgeting, net present value (NPV) - internal rate of return (IRR) comparisons, capital rationing, risk analysis and international capital budgeting.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcomes	Bloom's Knowledge Level (KL)
CO1	Apply tools for financial management decisions.	**K3**
CO2	Make use of techniques for identifying financial sources and analysis.	**K3**
CO3	Identify the tools for capital structure decisions and management.	**K3**
CO4	Apply techniques for working capital decisions and management.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	3	-	-	-	-	-	-	2
CO2	2	-	3	-	3	-	-	-	-	-	-	2
CO3	2	-	3	-	3	-	-	-	-	-	-	2
CO4	2	-	3	-	3	-	-	-	-	-	-	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Financial Management: Theory and Practice	Chandra, P	Tata McGraw Hill	9th Edition, 2017
2	Management Accounting	Gupta, S. K., Sharma, R. K.	Kalyani Publishers	1st Edition, 2017
3	Financial Management, Text, Problems & Cases	Khan, M. Y., Jain, P. K.	Tata McGraw-Hill	8th Edition, 2018
4	Financial Management	Pandey, I. M.	Vikas Publishing House	11th Edition, 2016.

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Financial Management and Policy: Text and Cases	Bhalla V. K.	Anmol Publications	9th Edition, 2009
2	Fundamentals of Financial Management	Brigham, E. F., Houston, J. F.	Cengage Learning	10th Edition, 2015
3	Principles of Managerial Finance	Gitman, L. J., Zutter, C. J	Pearson Education	13th Edition, 2017
4	Principles of Financial Management	Horne, J. C. V., Wachowicz, J	Pearson Education Limited	13th Edition, 2010
5	Financial Management	V. R. Palanivelu	S. Chand and Company Limited	2nd Edition, 2011

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/107/110107144/
	https://archive.nptel.ac.in/noc/courses/noc21/SEM1/noc21-mg06/

SEMESTER S7

CORPORATE FINANCE AND PORTFOLIO MANAGEMENT

Course Code	PEIET744	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To enable students to understand the basic concepts of corporate finance.
2. To provide students an insight into different aspects of portfolio management.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Capital budgeting**: Basic principles of capital budgeting, investment decision criteria - NPV, IRR, payback period, average accounting rate of return, profitability index, NPV profile, multiple IRR problem and no IRR, cash flow projections, project analysis and evaluation. **Cost of capital:** Costs of the different sources of capital, cost of debt, preferred stock, common equity, cost of capital estimation, beta estimation and project beta, country risk, marginal cost of capital schedule, flotation costs.	9
2	**Financial leverage:** Business risk and financial risk, capital structure - capital structure decision. **Dividends and share repurchase:** Dividends- forms, payment chronology, dividend policy and company value, factors affecting dividend policy, pay-out policies, analysis of dividend safety; Share repurchases- methods, effects of repurchases, valuation equivalence of cash dividends and share repurchases. **Working capital management:** Managing and measuring liquidity, managing the cash position, investing short-term funds, managing accounts receivable, managing inventory, managing accounts payable, managing	9

	short-term financing.	
3	**Corporate governance:** Importance, definitions, corporate governance considerations, board, management, shareowner rights, forms of business and conflicts of interest, sources of conflict, corporate governance evaluation. **Mergers and acquisitions:** Definitions and classifications, motives for merger, transaction characteristics, takeovers, regulation, merger analysis, corporate restructuring. **Portfolio management:** Overview, portfolio perspective on investing, investment clients, steps in the portfolio management process, pooled investments, portfolio concepts, mean-variance analysis, multifactor models, active portfolio management.	**9**
4	**Portfolio risk and return:** Investment characteristics of assets, risk aversion and portfolio selection, portfolio risk, efficient frontier and investor's optimal portfolio, capital market theory, pricing of risk and computation of expected return, capital asset pricing model (CAPM). **Portfolio planning and construction:** Portfolio Planning- investment policy statement (IPS), major components of an IPS, gathering client information, portfolio construction, capital market expectations, strategic asset allocation, steps toward an actual portfolio, additional portfolio organizing principles.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcomes	Bloom's Knowledge Level (KL)
CO1	Make use of the basic principles of capital budgeting and different costs of capital.	**K3**
CO2	Apply difference measures of leverage, dividends and management of working capital	**K3**
CO3	Identify the overall corporate governance process and basics of portfolios.	**K3**
CO4	Apply the basic principles of portfolios to assess portfolio risk and returns.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	3	-	-	-	-	3	2
CO2	2	2	2	-	-	3	-	-	-	-	3	2
CO3	2	2	2	-	-	3	-	-	-	-	3	2
CO4	3	3	3	-	-	3	-	-	-	-	3	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Capital Market Expectations Managing Investment Portfolios; A Dynamic Process	Calverly, John P.	Wiley	3rd Edition, 2007
2	Asset Allocation	Sharpe William F., Peng Chen, Jerald E. Pinto, Dennis W. McLeavy	Wiley	2nd Edition, 2007
3	Credit Suisse Global Investment Returns Sourcebook	Dimson, Elroy, Paul Marsh , Mike Staunton	Credit Suisse Research Institute	3rd Edition, 2009
4	The Black Swan: The impact of highly improbable	Taleb, Nassim N.	New York: Random House Inc,	2nd Edition, 2007

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Corporate Finance and Portfolio Management	CFA Institute	CFA Institute	1st Edition, 2011
2	Mergers, Acquisitions and Corporate Restructuring: Text and Cases	Chandrasekhar Krishnamurti, Viswanath S. R.	Atlantic	2nd Edition, 2023

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/105/110105156/

SEMESTER S7

INTRODUCTION TO STOCK MARKETS AND TRADING

Course Code	PEIET745	CIE Marks	40
Teaching Hours/Week (L:T:P:R)	3:0:0:0	ESE Marks	60
Credits	5/3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To enable students to apply techniques on stock markets and trading.
2. To equip students to identify tools for fundamental and technical analysis, and select derivatives and portfolios.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to stock markets**: Economic markets, types, stock markets- history and evolution of modern stock market, financial securities, types of securities, primary markets and secondary markets, trading instruments in the market, international stock exchanges, Indian stock exchanges -NSE-BSE, stock market indices, SEBI and its functions, financial Intermediaries, initial public offering (IPO), investment methods in stock markets.	9
2	**Trading and trading psychology**: Trading process, types of trading strategies- scalping intraday method, momentum trading, swing positional trading. Risk in trading, types of risks, risk- reward ratio, risk management, target and stop loss, hedging in trading. Trading psychology- emotions of traders, methods to overcome the emotions, biases of traders, traits of successful traders.	9
3	**Fundamental and technical analysis:** Fundamental analysis- pillars of fundamental analysis, top down and bottom up approach, Porter's five forces. Financial statements- balance sheet, profit & loss statement, cash flow statement. Financial ratios- leverage, liquidity, profitability and solvency banking ratios. Valuation of stocks- intrinsic value of stocks. Technical	9

	analysis- RWT theory, Dows theory, candlestick patterns, support and resistance, bullish, bearish and neutral candlestick patterns, types of technical indicators, break out theory.	
4	**Derivatives and portfolios**: Options trading - fundamentals, terminologies, option Greeks, strategies, option premium calculation problems. Forex trading - forex market, currency pairs, transactions. Commodity trading - benefits, type of commodities. **Portfolio management:** Ways of portfolio management, steps in portfolio management and strategies, portfolio diversification.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	*Internal Examination*	*Analyse*	*Evaluate*	*Total*
5	**15**	**10**	**10**	**40**

Criteria for Assessment (Analyse and Evaluate): 20 marks

Phases	Assessment Criteria	Marks
Analyse	***Problem Definition*** ● *Clearly defines the real-world quality issue.* ● *Examine and identify relevant contextual factors.*	**5**
	Problem Analysis ● *Present a structured realistic solution methodology.* ● *Compare and justify the proposed solutions with evidence and logical reasoning*	**5**
Evaluate	***Validation of Results*** ● *Thoroughly evaluate the proposed solutions.* ● *Compares trade-offs, advantages, and disadvantages.* ● *Considers feasibility, scalability, and practical implications.*	**5**
	Conclusion and Report Writing ● *Summarizes procedure, findings and insights, limitation, and scope for future work.* ● *Preparation of Report with all components of project report.*	**5**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes		Bloom's Knowledge Level (KL)
CO1	Apply the techniques of stock markets.	**K3**
CO2	Identify trading and trading psychology.	**K3**
CO3	Apply tools on fundamental and technical analysis	**K3**
CO4	Make use of techniques to select derivatives and portfolios.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**--**	**-**	**-**	**-**	**2**
CO2	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Beginners Guide to Stock Market	Matthew R Kratter	Trader University	1st Edition, 2023
2	Fundamental Analysis for Investors	Raghu Palat	Vision Books	4th Edition, 2016
3	Technical Analysis for Dummies	Barbara Rockefeller	Wiley Publication	3rd Edition, 2014
4	Option traders guide to Probability, Volatility and timing	Jay Kaeppel	Wiley Publications	Illustrated Edition, 2002

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Modern Equity Investing Strategies	Anatoly B Schmidt	World Scientific	1st Edition, 2021
2	Technical Analysis of Financial Markets	John J Murphy	New York Institute of Finance	Special Indian Edition, 2020

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/105/110105121/

SEMESTER S7

PERSONNEL MANAGEMENT AND INDUSTRIAL RELATIONS

Course Code	PEIET751	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To develop basic skills in students for maintaining good industrial relations and personnel functions in organisations.
2. To enable the student to apply the interaction pattern among labour, management and organization.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to personnel management:** Meaning, concept, functions and evolution of personnel management, importance of personnel management, evolution of human relation department from personnel management, relationship between labour, management and state. **Human resource planning:** Meaning and concept, need for human resource planning, types of human resource planning, concept of job analysis, uses of job analysis information.	9
2	**Performance appraisal and compensation:** Defining performance appraisal, importance of performance appraisal, performance appraisal policy, compensation policies and methods, wage determination process and factors influencing wage and salary administration, types of wage, minimum wage, fair wage, living wage, money and real wage.	9
3	**Industrial relations (IR):** Meaning, definition, concept and scope, objectives, and elements of IR, factors affecting industrial relations, defining industrial conflict and disputes, causes and effect of industrial dispute, source of grievances, grievances handling procedures, concept of social justice,	9

	origin and growth of concept of labour welfare, role of government in labour welfare, role of trade union in industrial relation.	
4	**Industrial dispute settlement mechanisms:** Various dispute settlement machinery, mediation conciliation process, role, concept of arbitration and methods of arbitration, compulsory and voluntary arbitration, court of enquiry, labour courts, industrial tribunals, functions of industrial tribunal in state level and national level, distinction between conciliation, arbitration and adjudication, worker's participation in management, collective bargaining.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 = 24marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain the concepts of personnel management and human resource planning.	**K2**
CO2	Apply the knowledge of performance appraisal and compensation of employees.	**K3**
CO3	Demonstrate the concepts of industrial relations in organisations.	**K2**
CO4	Apply the concepts of dispute settlement mechanism and workers participation in management	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	2	-	-	-	-	-	-	-	2
CO2	2	-	3	3	-	-	-	-	-	-	-	2
CO3	2	-	3	3	-	-	-	-	-	-	-	2
CO4	2	-	2	2	-	-	-	-	-	-	-	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Personal Management: Text and Cases	Mamoria C. B., Gankar S. V.	Himalaya Publishing House	1st Edition, 2011
2	Essentials of HRM and Industrial Relation	Subba Rao P.	Himalaya Publishing House	5th Edition, 2014
3	Personal Management & Industrial Relations	Tripathi P. C.	S. Chand & Sons	22nd Edition, 2013

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Industrial Relations	Venkata Ratnam C. S., Manoranjan Dhal	Oxford University Press, New Delhi	2nd Edition, 2017
2	Industrial relation, Trade Union & Labour Relation	P. R N. Sinha, Indu Bala Sinha	Pearson	3rd Edition, 2017

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/105/110105069/
	https://archive.nptel.ac.in/courses/122/105/122105020/

SEMESTER S7

MARKETING MANAGEMENT

Course Code	PEIET752	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To equip the student to understand the concepts of marketing and its role in the business environment.
2. To enable the student to apply the marketing mix elements, the buyer behaviour and the contemporary marketing domains.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to marketing:** Defining marketing, core concepts in marketing, evolution of marketing, marketing planning process. **Scanning business environment:** Internal and external, value chain, competitor analysis, strategies and core competencies, PESTEL framework, SWOT analysis, marketing interface with other functional areas, Marketing Research and Marketing Information System, prospects and challenges in marketing.	9
2	**Marketing strategy:** Strategic market planning, corporate strategy, business strategy, product strategy, services marketing, product and brand management, consumer markets, business/industrial markets, analysis of consumer and industrial markets, defining Market Segmentation, Targeting and Positioning (STP) and strategies in STP.	9
3	**Marketing mix decisions:** Marketing mix elements, product planning and development, Product Life Cycle (PLC), new product	9

	development, pricing objectives, methods and strategies, factors affecting price decisions, managing integrated marketing channels, managing retailing, wholesaling and logistics, Integrated Marketing Communications (IMC), advertising and sales promotion, public relations and publicity.	
4	**Buyer behaviour:** Understanding industrial and consumer buyer, factors influencing buyer behaviour, buyer behaviour models, building and measuring customer satisfaction. **Trends in marketing management:** Relationship marketing, relationship management, customer relationship management (CRM), CRM practices, online marketing, big data and artificial intelligence (AI) in marketing.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain the concepts in marketing and marketing environment	**K2**
CO2	Apply the appropriate strategic knowledge in marketing	**K3**
CO3	Demonstrate the marketing mix elements and decisions	**K2**
CO4	Make use of the knowledge of buyer behaviour and trends in marketing	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**2**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**2**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Marketing Management	Ramaswamy, V.S., Namakumari S	Sage Publication	6th Edition, 2018
2	Marketing Management	Chandrasekar K S	Vijay Nicole	2nd Edition, 2019

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Marketing Management	Kotler Philip, Keller	Pearson India Education	15th Edition, 2016
2	Fundamentals of Marketing	Stanton, W.J, Michael Etezel, Bruce J.Walker	McGraw Hill	9th Edition, 1991
3	Marketing Management	Saxena Rajan	Tata McGraw Hill.	6th Edition, 2019

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/104/110104068/
	https://archive.nptel.ac.in/courses/110/104/110104070/

SEMESTER S7

GREEN MANUFACTURING

Course Code	**PEIET753**	**CIE Marks**	40
Teaching Hours/Week (L:T:P:R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To enable students to familiarise the concepts of environmental sustainability and green energy systems.
2. To equip students with knowledge on energy saving concepts in the manufacturing sector and the GreenCo rating system.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Environmental sustainability and impact assessment:** Environmental impact assessment objectives, legislative development, European community directive, Hungarian directive. Strategic environmental assessment and sustainability appraisal, regional spatial planning and environmental policy.	**9**
2	**Lean manufacturing and green energy system:** Conventional manufacturing versus lean manufacturing, principles of lean manufacturing. World energy consumption - greenhouse effect, global warming. Energy conservation and measurement principles with their applicability in engineering and process industries.	**9**
3	**Energy saving machinery:** Electricity billing, components and costs, need and control, determination of kVA demand and consumption. Selection of fans, pumps and compressors, performance evaluation, cause for inefficient operation, scope for energy conservation.	**10**

	Solid waste management: Definition, terminology, classification and sources, need for hazardous waste management - need, handling, methods of collection, storage and transport with suitable examples. Solid waste management- need, waste prevention and life cycle assessment, collection, storage, reuse and recycling of solid waste with suitable examples.	
4	**GreenCo rating:** Ecological footprint - need for GreenCo rating, GreenCo rating system, parameters, intent, system approach, weightage, assessment process, types of rating, GreenCo benefits, case studies of GreenCo rating - manufacturing sector, automobile, FMCG and fertilisers, service sector, logistics, airports and hotels.	**8**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes		Bloom's Knowledge Level (KL)
CO1	Apply the concepts of environmental sustainability and environmental impact assessment.	**K3**
CO2	Apply suitable schemes towards design of green manufacturing requirements.	**K3**
CO3	Analyze manufacturing processes towards conservation of energy and prevention of hazardous and solid wastes.	**K4**
CO4	Apply the concepts of green co-rating in organisations.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**
CO2	**2**	**2**	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**
CO3	**2**	**2**	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**
CO4	**2**	**2**	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Green Manufacturing Fundamentals and Applications	David A. Dornfeld	Springer Science & Business Media	1st Edition, 2012
2	Design and Analysis of Lean Production Systems	Ronald G. Askin and Jeffrey B. Goldberg	John Wiley and Sons	1st Edition, 2001
3	Environment and Sustainability Policy: Creation, implementation, Evaluation	Stephen Doven	The Federation Press	1st Edition, 2005

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Impact Assessment and Sustainable Development: European Practice and Experience (Evaluating Sustainable Development series)	Clive George, Collin C., Kirkpolarice. H,	Edward Elgar Publishing Ltd.	1st Edition, 2007
2	Green Manufacturing: Case Studies in Lean and Sustainability	Association for Manufacturing Excellence	Productivity Press	1st Edition, 2017
3	Energy Auditing and Conservation, Methods Measurements, management and Case Study	Yacov Y. Haimes Marguerite A., H. Ruffner	Taylor & Francis Inc	1st Edition, 1980
4	Advances in sustainable manufacturing	Seliger G., Khraisheh,M. M. and Jawahir I. S.	Springer Science & Business Media.	1st Edition, 2011
5	Green Design and Manufacturing for Sustainability	Nand K. Jha	CRC Press	1st Edition, 2015

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/112/104/112104225/
	https://archive.nptel.ac.in/courses/110/104/110104119/

SEMESTER S7

INDUSTRIAL SAFETY AND HEALTH

Course Code	**PEIET754**	**CIE Marks**	40
Teaching Hours/Week (L:T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To provide a detailed understanding of occupational safety and its impacts in worker's health.
2. To provide an adequate background for applying the concept of safety in working environments.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to industrial safety:** Definitions, safety systems, safety information system, basic concepts, definition of accidents, analysis of causes of accident. **Fire protection systems:** Automated fire fighting system, chemistry of fire, water sprinkler, fire hydrant, alarm and detection system. Suppression systems - CO2 system, foam system, DCP system, halon system, portable extinguisher.	9
2	**Managing safety:** Safety inspection, procedure, periodicity, checklist, report forms. Planning for safety and productivity, safety sampling, safety audit, safety survey, JSA, accident prevention. Work permit and lock out system, accident analysis, safety education, communication and safety performance analysis. Personal protective equipment testing, usage.	9
3	**Safety in material handling:** Selection of material handling equipment, equipment used, ropes, chains, slings, hooks, clamps,	9

	procedure for testing and checking as per standard. Design conservation, conveyor systems, belt, roller chain and elevator and lifts, industrial hoists, mobile crane, forklift, operation maintenance and checking procedure.	
4	**Hazard analysis:** Electrical, physical and chemical hazards, detailed hazard analysis, cost effectiveness in hazard eliminations, fault tree analysis and HAZOP, safety legislation- provisions in factory act for safety, explosive act, workmen compensation act, compensation calculation, boiler act, pollution control act.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain the basic concepts of industrial safety and to identify the use of fire protection systems in organisations.	**K3**
CO2	Make use of safety systems and procedures in organisations.	**K3**
CO3	Identify the safety of material handling systems.	**K3**
CO4	Apply hazard analysis and to make use of provisions of safety legislations in organisations.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**-**	**3**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**2**	**-**	**3**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**2**	**-**	**3**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**2**	**-**	**3**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Industrial Safety Management: 21st Century Perspectives of Asia	J Maiti, Pradip Kumar Ray	Springer	Online Edition, 2017
2	Industrial Safety Management: Hazard Identification and Risk Control	L. M. Deshmukh	McGraw-Hill Education	1st Edition, 2017
3	Safety at Work	John Ridley, John Channing	Routledge	7th Edition, 2007
4	Industrial Safety, Health and Environment Management Systems	R.K. Jain, Prof. Sunil S. Rao	Khanna Publishers	4th edition, 2000

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Accident Prevention Manual for Business & Industry: Engineering & Technology	National Safety Council	National safety council, Chicago.	14th Edition, 2015
2	Fault Tree Handbook	W. E. Vesely, F. F. Goldberg	Create space Independent Pub	1st Edition, 2014
3	Fire Prevention Handbook	Derek James	Buttes Worths and Co.	1st Edition, 1986
4	Industrial Accident Prevention: A safety management approach	Herbert William Heinrich, Dan Petersen, Nestor R. Roos	McGraw Hill Inc.	5th Edition, 1980

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/105/110105094/

SEMESTER S7

MARKETING RESEARCH

Course Code	**PEIET 755**	**CIE Marks**	40
Teaching Hours/Week (L:T:P:R)	3:0:0:0	**ESE Marks**	60
Credits	5/3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To enable the student to understand the importance of marketing research and research interventions.
2. To equip the student to apply knowledge to analyse the market with appropriate research methods.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to marketing research:** Define marketing research, scope, importance, classification, functions, role of marketing research in decision making, marketing research process. **Defining marketing research problem:** Identifying the problem, discussions and interviews with experts, insights from secondary data, marketing environment analysis, problem definition, decisions towards approaching the problem.	9
2	**Research design:** Defining the research design, classification of research design, exploratory research, descriptive research, causal research design, qualitative research techniques. **Sources of data:** Secondary data - internal Sources and external sources, international secondary data, role of secondary data in marketing research, primary data - survey and observation, experimentation.	9

3	**Sampling and scaling:** Sampling design process, probability sampling methods, non-probability sampling methods, online sampling techniques, determination of sample size. Scale characteristics, levels of measurement, primary scales, comparative scaling techniques, non-comparative scales, scale evaluation, relation between reliability and validity. **Data collection:** Data instruments, questionnaires, observation forms, Designing Questionnaire, determinants in question wording and order, form and layout.	**9**
4	**Data analysis and research report writing:** Data preparation process for analysis. procedures for hypothesis testing, parametric tests and non-parametric tests, basic concepts of analysis of variance and Correlation and regression, statistical software, importance of report preparation and presentation, elements of quality report, report format and layout. **Applications of marketing research:** Product research, advertising research, market and sales analysis research, social media marketing, branding, case studies in marketing research.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	***Internal Examination***	***Analyse***	***Evaluate***	***Total***
5	**15**	**10**	**10**	**40**

Criteria for Assessment (Analyse and Evaluate): 20 marks

Phases	**Assessment Criteria**	**Marks**
Analyse	***Problem Definition*** *a. Clearly defines the real-world quality issue.* *b. Examine and identify relevant contextual factors.*	**5**
	Problem Analysis *a. Present a structured realistic solution*	**5**

	methodology. *b. Compare and justify the proposed solutions with evidence and logical reasoning*	
Evaluate	***Validation of Results*** *a. Thoroughly evaluate the proposed solutions.* *b. Compares trade-offs, advantages, and disadvantages.* ***c.*** *Considers feasibility, scalability, and practical implications.*	**5**
	Conclusion and Report Writing *a. Summarizes procedure, findings and insights, limitation, and scope for future work.* *b. Preparation of Report with all components of project report.*	**5**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes		Bloom's Knowledge Level (KL)
CO1	Explain the market research process and outline the market research problem.	**K2**
CO2	Apply appropriate research designs in real world scenario.	**K3**
CO3	Identify suitable methods of sampling and data collection.	**K3**
CO4	Analyse the data for better decision making with the support of software.	**K4**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	2	-	-	-	-	-	-	-	3
CO2	2	3	3	3	-	-	-	-	-	-	-	3
CO3	2	3	3	3	-	-	-	-	-	-	-	3
CO4	2	3	3	3	-	-	-	-	-	-	-	3

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Marketing Research: An Applied Orientation	Naresh K. Malhotra	Tata McGraw Hill	6th Edition, 2009
2	Marketing Research: Text and Cases	Nargundkar R.	Tata McGraw Hill	4th Edition, 2020
3	Market Research	Beri G. C.	McGraw Hill	6th Edition, 2020

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Marketing Research	Boyd, Westfall, Statsch	Irwin Inc	7th Edition, 1989
2	Business Research Methods	William G. Zikmund	Cengage Learning	9th Edition, 2012
3	Marketing Research, Concept & Cases	Cooper, Schindler	Tata McGraw Hill	1st Edition, (Indian Edition) 2005

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/107/110107080/

SEMESTER S7

HUMAN RESOURCE MANAGEMENT

Course Code	**OEIET721**	**CIE Marks**	40
Teaching Hours/Week (L:T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To enable the student to understand the strategies and processes of human resource management.
2. To equip the student to analyse the implications of human resource practices at individual, and organisational level.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to human resources management (HRM):** Significance of HRM, definition, scope, functions, and objectives of HRM, roles of HR managers, introduction to HR analytics, HR accounting, HR audit, human resource information system, human resource planning (HRP), factors affecting HRP, process and methods of forecasting the demand and supply of human resources.	**9**
2	**Job analysis and job design:** Defining job analysis and its process, job description, job specification, methods of job design. **Recruitment and selection:** Defining recruitment, methods, and process in recruitment, Defining selection, process, and methods of selection, selection tests and its importance, types of interviews, induction/orientation, definition and types of transfer, promotion and demotion.	**9**
3	**Performance assessment and training:** Defining performance appraisal, its process and methods, training need	**9**

	assessment/identification (TNA/TNI), importance of training, on the job vs. off the job training, evaluation of training, past oriented and future oriented employee training. **Wages and salary administration:** Defining job evaluation, process and methods of job evaluation, basics of compensation, definition and types of compensation, differentiate wages and salary, methods of wage determination, wage theories and concepts, minimum wage, fair wage, living wage.	
4	**Employee relations:** Defining industrial relations (IR), objectives of IR, parties to IR, Trade Unions in India, defining participative management, methods of workers participatory management, Collective Bargaining. **Employee discipline and grievance**: Definition and settlement of grievance, open door vs. step ladder technique, defining industrial disputes, dispute settlement machinery, bipartite and tripartite bodies in India, industrial disputes act, factories act.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Make use of HRM strategies and processes of modern organizations.	**K3**
CO2	Apply the concepts of job analysis, recruitment and selection processes.	**K3**
CO3	Make use of performance appraisals and appropriate wage administration.	**K3**
CO4	Identify the implications of employee relations and industrial legislations.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**2**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**2**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Human Resource and Personnel Management - Text and Cases	Aswathappa K.	Tata McGraw-Hill Publishing Co. Ltd	4th Edition, 2005
2	Essentials of Human Resource Management and Industrial Relations	Subba Rao P.	Himalaya Publishing House	5th Edition, 2014

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Human resource management: Strategic and international perspectives.	Crawshaw, J., Budhwar, P., Davis, A.	Sage Publications	1st Edition, 2014
2	A handbook of human resource management practice	Armstrong, M.	Kogan Page Publishers	1st Edition, 2006
3	Industrial Relations	Venkata Ratnam S.	Oxford University Press	5th Edition, 2006

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/110/105/110105069/
	https://archive.nptel.ac.in/courses/122/105/122105020/

SEMESTER S7

INDUSTRIAL ENGINEERING AND MANAGEMENT

Course Code	**OEIET722**	**CIE Marks**	40
Teaching Hours/Week (L:T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To enable students to familiarise the concepts of industrial engineering and management.
2. To equip the students to apply the concepts of industrial engineering and management in real world scenarios.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Evolution of Scientific Management and Industrial Engineering**: Activities of industrial engineering, techniques of industrial engineering, functions of Management -brief description of each function. Types of Organization structures, types of companies and their formation. **Productivity and work study:** Definitions, methods study and work measurement, use of charts and diagrams. Performance rating and methods, types of allowances, computation of basic time and standard time.	**9**
2	**Facility location:** Factors influencing plant location, plant layout, different types of layouts, material flow pattern, layout planning, computerized layout planning techniques. **Production planning and control:** Functions and objectives, job, batch, mass and continuous production. Materials Management - inventory, determination of economic order quantity, inventory control techniques.	**9**

3	**Quality engineering**: Quality control, control chart for variables and attributes, introduction to ISO-9000 series, ISO 14000 series, total quality management, six sigma concepts, quality information systems, benchmarking and documentation. **Reliability concepts:** Definition of reliability, reliability vs. quality, reliability function, MTTF, hazard rate function, bathtub curve, derivation of the reliability function, failure and failure modes, causes of failures and unreliability.	**9**
4	**Financial management**: Scope of financial management, functions and objectives of financial management, working capital, factors affecting working capital, working capital cycle, depreciation and methods of calculating depreciation. **Personnel Management**: Objectives and functions, recruitment, selection, training, induction, concepts and techniques of wages and incentive systems. **Industrial relations**: Fatigue and methods of eliminating fatigue, industrial disputes, collective bargaining, trade unions.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes		Bloom's Knowledge Level (KL)
CO1	Explain the concepts of industrial engineering and management and to apply work study techniques for improvement of productivity.	**K3**
CO2	Make use of concepts of facility location and production planning control in industries.	**K3**
CO3	Apply the concepts of quality and reliability in industries.	**K3**
CO4	Make use of the concepts of financial management, personnel management and industrial relations in organisations.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**2**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**2**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**2**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Essentials of Management: An International Perspective	H. Koontz, H. Weihrich	McGraw-Hill	8th Edition, 2009
2	Principles of management	P C Tripathi, P N Reddy	TMH	4th Edition, 2008

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Introduction to Work Study	ILO	Oxford and IBH	3rd Edition, 2015
2	Operations Management	William J. Stevenson	McGraw-Hill Education	14th Edition, 2020
3	Production and Operations Management	R. Paneerselvam	PHI Learning	3rd Edition, 2012
4	Total Quality Management	Besterfield Dale H, et al.	Pearson Education	5th Edition, 2018
5	Reliability Engineering	Balagurusamy E.	Tata McGraw Hill	1st Edition, 2017
6	Reliability Engineering	Srinath L. S.	East West Press	4th Edition, 2005
7	Financial Management	M. Y. Khan, P. K. Jain	Tata-McGraw Hill	8 th Edition, 2018.
8	Human Resources and Personnel Management: Text and Cases	K. Ashwathappa	Tata-McGraw Hill	4th Edition, 2005
9	Industrial Relations	Venkata Ratnam C. S., Manoranjan Dhal	Oxford University Press, New Delhi	2nd Edition, 2017

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/112/107/112107292/
	https://archive.nptel.ac.in/courses/112/107/112107249/
	https://archive.nptel.ac.in/courses/110/107/110107141/
	https://archive.nptel.ac.in/courses/112/107/112107143/
	https://archive.nptel.ac.in/courses/110/105/110105088/
	https://archive.nptel.ac.in/courses/110/107/110107144/
	https://archive.nptel.ac.in/courses/110/105/110105069/
	https://archive.nptel.ac.in/courses/122/105/122105020/

SEMESTER S7

PRODUCTION AND OPERATIONS MANAGEMENT

Course Code	OEIET723	CIE Marks	40
Teaching Hours/Week (L:T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To enable students to apply production and operations management concepts including product design, process selection, modern production systems and sustainability.
2. To equip students to demonstrate proficiency in forecasting, aggregate planning, material and capacity management and production activity control.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to production and operations management (POM):** Objectives and scope of POM, historical evolution and perspectives, operations strategy and productivity, relationship with other functional areas, manufacturing vs service sectors, operations decision making, phases in product design and development, product life cycle management, process selection, sustainability in operations.	9
2	**Forecasting for operations management:** Need for forecasting and determinants of demand, forecasting methods - qualitative methods - delphi technique, market research, nominal group technique, quantitative methods - moving average, exponential smoothing, regression analysis, Winter's model, analysis of forecast errors. **Aggregate planning:** Managerial inputs, pure and mixed strategies, mathematical models - transportation method, linear programming, linear decision rules.	9

3	**Material requirement planning:** Master production schedule (MPS) - development and implementation, material requirement planning (MRP) and MRP-II, enterprise resource planning (ERP). **Capacity management:** Capacity measures and influencing factors, long-term vs short-term capacity planning, systematic capacity planning approach, tools and techniques for capacity management, capacity requirement planning (CRP), business process outsourcing (BPO).	**9**
4	**Production activity control (PAC):** Objectives of PAC, scheduling techniques, job shop production, activity planning, shop loading, sequencing and dispatching rules. **Modern production systems**: Just-in-time (JIT) and kanban systems, lean manufacturing, kaizen and continuous improvement, Toyota production system (TPS), business process re-engineering, world class manufacturing concepts.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes		Bloom's Knowledge Level (KL)
CO1	Explain the concepts of production operations management, and to apply operations strategies, product life cycle management, and process selection with a focus on sustainability.	**K3**
CO2	Demonstrate the ability to forecast demand using various techniques and develop aggregate production plans using both qualitative and quantitative methods.	**K3**
CO3	Develop Material Requirement Planning (MRP), and capacity planning techniques.	**K3**
CO4	Apply production activities and modern production systems in industries.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**2**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**2**
CO3	**3**	**2**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**2**
CO4	**3**	**2**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Operations Management: Processes and Supply Chains	Lee J. Krajewski, Manoj Malhotra	Pearson Education	14th Edition, 2024
2	Operations Management	William J. Stevenson	McGraw-Hill Education	14th Edition, 2020
3	Production and Operations Management	R. Paneerselvam	PHI Learning	3rd Edition, 2012

Reference Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Introduction to Operations and Supply Chain Management	Cecil B. Bozarth, Robert B. Handfield	Pearson	5th Edition, 2019
2	Operations Management: Sustainability and Supply Chain Management	Jay Heizer, Barry Render, Chuck Munson	Pearson	14th Edition, 2022
3	Operations Management: Processes and Value Chains	Lee J. Krajewski, Larry P. Ritzman, Manoj K. Malhotra	Pearson	10th Edition, 2012
4	Production and Operations Management	S. N. Chary	McGraw-Hill	6th Edition, 2019
5	Operations Management: Theory and Practice	B. Mahadevan	Pearson India	3rd Edition, 2015

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/112/107/112107238/
	https://archive.nptel.ac.in/courses/110/107/110107141/

SEMESTER S7

SYSTEM SIMULATION

Course Code	OEIET724	CIE Marks	40
Teaching Hours/Week (L:T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To enable students to construct a theoretical base for applying simulation in various interdisciplinary areas.
2. To enable students to model and simulate discrete and continuous systems.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**System concepts**: Concepts of a system, system environment, continuous and discrete systems, system models, areas of application of simulation, steps in discrete event simulation study. **Random numbers**: Properties of random numbers, generation of pseudo-random numbers, random number generators. **Tests for random numbers:** Frequency, gap, run, and Poker tests, test for autocorrelation, Monte Carlo method.	9
2	**Random variates**: Generation of random variates, inverse transformation method for exponential, uniform, Weibull, triangular, and discrete distributions. Direct transformation method for normal and lognormal distributions. Acceptance-rejection technique for Poisson and Gamma distributions. **Input modelling**: Data collection, identifying the distribution with the collected data, goodness of fit tests, selecting input models without data. Verification and validation of simulation models, output data analysis, variance reduction techniques. **Time advance mechanisms for discrete event simulation:** Next-event time	9

	advance and fixed increment time advance methods.	
3	**Introduction to system dynamics:** Evolution of system dynamics as a system enquiry methodology – general systems theory, cybernetics, the systems approach, system dynamics approach. **Elements of system dynamics:** Modelling, physical flows, information flows, level & rate variables, delays, information smoothing, table functions and table function multipliers, causal loop diagramming, flow diagrams. steps for modelling in system dynamics.	**9**
4	**Behaviour of systems**: Analytical approach to behaviour of linear low-order systems - first order positive and negative feedback systems, pure second order positive and negative feedback systems. Fundamental modes of dynamic behaviour - exponential growth, goal seeking, oscillation, Interactions of fundamental modes. **System dynamics modelling**: Principles of simulation modelling, developing model equations, algorithm for Euler integration, hand simulation of system dynamics models, S-shaped growth, epidemics, innovation diffusion and growth of new products. Overview of software packages for system modelling and simulation. Case studies.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain the basic concepts of the system and its simulation in interdisciplinary areas; demonstrate the generation of random numbers and its testing.	**K2**
CO2	Perform input modeling for discrete simulation, verify and validate simulation models and perform output data analysis.	**K3**
CO3	Illustrate various elements of system dynamics modelling; construct causal loop diagrams and Flow diagrams.	**K3**
CO4	Develop the fundamental modes of dynamic behaviour and their interactions; Model and Analyze systems using the principles of system dynamics.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**3**	**3**	**2**	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**2**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Discrete Event System Simulation	Jerry Banks	Pearson Education	5th Edition, 2013
2	Introduction to System Dynamic Modeling	M. C. Bora, Pratap K. J. Mohapatra, P. Mandal	Universities Press	1st Edition, 1994

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Simulation Modeling and Analysis	A. M. Law	McGraw Hill	6th Edition, 2024
2	System Simulation	Geoffrey Gordon	Prentice Hall India	2nd Edition 2020
3	Discrete Event Simulation: Modeling, Programming and Analysis	George Fishman	Springer series in Operations Research and Financial Engg.	1st Edition, 2001
4	System Simulation with Digital Computer	Deo Narsingh	Prentice Hall India	24th Edition, 2011
5	Simulation	Sheldon M. Ross	Elsevier	6th Edition 2023
6	Business Dynamics – Systems Thinking and Modeling for a Complex World	John D. Sterman	McGraw Hill	1st Edition, 2000

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/112/107/112107220/
	https://archive.nptel.ac.in/courses/110/101/110101142/