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SUPPLY CHAIN MANAGEMENT **Course Code : 316361**

Programme Name/s : **Production Engineering**
Programme Code : **PG**
Semester : **Sixth**
Course Title : **SUPPLY CHAIN MANAGEMENT**
Course Code : **316361**

I. RATIONALE

Modern production demands efficient supply chains. This course covers core SCM principles, including network design, procurement, logistics, and inventory management. Students will be exposed to technological integrations like ERP and RFID, and also examine emerging trends such as AI and sustainable practices. The knowledge and skills gained through the course will help the students to optimize material flow, reduce costs, and enhance production efficiency.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the students to attain the following industry identified outcome through various teaching learning experiences: Manage supply chain operations.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Outline challenges and best practices in supply chain management.
- CO2 - Design a supply chain network considering distribution and forecasting techniques.
- CO3 - Apply procurement, logistics, and inventory management techniques to streamline supply chain operations.
- CO4 - Utilize modern SCM technologies to enhance supply chain efficiency.
- CO5 - Analyze emerging trends to enhance future supply chain systems.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme										
				Actual Contact Hrs./ Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical					
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316361	SUPPLY CHAIN MANAGEMENT	SCM	DSE	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Describe the concept of supply chain management. TLO 1.2 Explain the decision phases of supply chain . TLO 1.3 Classify the supply chain macro processes in a firm. TLO 1.4 Describe the cycle and push/pull views of a supply chain. TLO 1.5 Enlist the major drivers of supply chain performance.	**Unit - I Fundamentals of Supply Chain Management** 1.1 Definition, objectives of supply chain management (SCM) and importance. 1.2 Decision phases in supply chain 1.3 Process views of a supply chain. 1.4 Supply Chain Macro process in firm: - Customer relationship management, internal SCM, supplier relationship management. 1.5 Drivers of supply chain: - Facility, inventory, transportation, information, pricing and sourcing.	Video Demonstrations Case Study Presentations Lecture Using Chalk-Board
2	TLO 2.1 Describe the role of network design in a supply chain. TLO 2.2 List the factors influencing supply chain network design decisions. TLO 2.3 Compare different distribution network designs. TLO 2.4 Explain the role of forecasting in supply chain management. TLO 2.5 Describe the importance of aggregate planning in supply chain activity.	**Unit - II Supply Chain Network Planning & Design** 2.1 Supply Chain Network Design. 2.2 Role of distribution in supply chain. 2.3 Factors influencing distribution network design. 2.4 Design options for a distribution network. 2.5 Role of Forecasting in SCM. 2.6 Aggregate Planning: Role, strategies & aggregate planning problem.	Video Demonstrations Presentations Lecture Using Chalk-Board
3	TLO 3.1 Outline the steps of the procurement process. TLO 3.2 Describe the responsibilities of purchasing and its role in supply chain efficiency. TLO 3.3 Select supplier based on given evaluation criteria. TLO 3.4 Explain the role of material transportation in logistics management. TLO 3.5 Compare the roles of Third-Party Logistics (3PL) and Fourth-Party Logistics (4PL) in supply chain operations. TLO 3.6 Identify different types of inventory and their functions in a supply chain. TLO 3.7 Explain the function of different inventory control techniques. TLO 3.8 Describe the principles of Lean Inventory Systems.	**Unit - III Procurement, Logistics and Inventory Management** 3.1 Procurement process: need, identification, supplier selection. 3.2 Purchasing: objective and responsibility. 3.3 Supplier evaluation criteria. 3.4 Logistics Management - Transportation, Warehousing, Material Handling. 3.5 Role of Third-Party Logistics (3PL) and Fourth-Party Logistics (4PL). 3.6 Inventory Types and Functions. 3.7 Inventory Control Techniques – Always Better Control Analysis (ABC), Vital, Essential, Desirable Analysis (VED), Fast-moving, Slow-moving, Non-moving Analysis (FSN). 3.8 Introduction of Lean Inventory Systems.	Video Demonstrations Demonstration Presentations Lecture Using Chalk-Board
4	TLO 4.1 Explain the role of Information Technology in enhancing supply chain operations. TLO 4.2 Explain digital technologies on supply chains. TLO 4.3 Explain the application of	**Unit - IV Technologies in SCM** 4.1 Role of Information Technology in SCM. 4.2 Introduction of Digital Supply Chains. 4.3 Application of Radio Frequency Identification (RFID), Barcode Systems and Internet of things (IoT) in SCM.	Video Demonstrations Model Demonstration Presentations Lecture Using

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Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
	RFID, barcode systems and IoT in modern supply chain management. TLO 4.4 Examine the challenges of drones in logistics and delivery in a supply chain.	4.4 Automated Guided Vehicles (AGVs) and Robotics – Role in warehouse automation. 4.5 Drones in Logistics and Delivery – Applications and challenges.	Chalk-Board
5	TLO 5.1 Explain green and sustainable supply chain practices in modern industries. TLO 5.2 Describe the role of ERP systems and SCM software. TLO 5.3 Compare the effects of emerging trends on traditional versus modern supply chains. TLO 5.4 Explain the role of AI in supply chain management.	**Unit - V Emerging Trends in SCM** 5.1 Green and Sustainable Supply Chains. 5.2 Software Tools in SCM: Role of ERP systems and SCM software in modern supply chains. 5.3 Future Trends: blockchain, smart factories, and autonomous logistics systems. 5.4 Role of Artificial intelligence (AI) in SCM: Automation in logistic, chatbot & virtual assistant, Supply Chain Optimization.	Video Demonstrations Flipped Classroom Presentations Lecture Using Chalk-Board

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Specify the impact of facility, inventory, and transportation drivers on a production process using a structured table.	1	Key Supply Chain Drivers.	2	CO1
LLO 2.1 Construct a supply chain flowchart for a given production item (e.g., gear) LLO 2.2 Identify macro processes (CRM, internal SCM, SRM).	2	*Production Supply Chain Map.	2	CO1
LLO 3.1 Identify the challenges and best practices in supply chain management specific to the machinery industry.	3	*SCM Practices in Machinery Production.	2	CO1
LLO 4.1 Design a distribution network layout for production parts (e.g., bolts) considering cost and location factors.	4	*Distribution Network for a Given Product.	2	CO1 CO2
LLO 5.1 Calculate demand forecasts for a given production item (e.g., pistons). LLO 5.2 Predict future demand based on historical sales data.	5	Forecast Production Demand	2	CO1 CO2
LLO 6.1 Identify key factors in supplier evaluation (cost, quality, delivery time). LLO 6.2 Use a weighted scoring method to compare different suppliers.	6	*Workshop Materials Supplier Review.	2	CO1 CO3
LLO 7.1 Plan an efficient layout for storage and material flow in the workshop. LLO 7.2 Demonstrate proper use of material handling equipment (trolleys, hoists).	7	Material Handling Framework in the Institute Workshop.	2	CO1 CO3
LLO 8.1 Perform ABC analysis to categorize materials based on usage value. LLO 8.2 Perform VED analysis to classify items based on criticality.	8	*ABC and VED Profile of Workshop Inventory.	2	CO1 CO3
LLO 9.1 Identify ways to reduce excess inventory and optimize stock levels.	9	*Lean Inventory Approach in the Workshop.	2	CO3
LLO 10.1 Construct a workshop storage layout to optimize material handling for production processes.	10	Workshop Storage System.	2	CO3

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 11.1 Identify the role of ERP in supply chain management. LLO 11.2 Use an ERP software to manage inventory.	11	*ERP System Overview for Student Cooperative Store.	2	CO1 CO4
LLO 12.1 Demonstrate the application of AGVs in a simulated warehouse material handling scenario. LLO 12.2 Demonstrate the use of robotics in a simulated material handling task in a workshop setting.	12	Warehousing Automation with AGVs and Robotics.	2	CO4
LLO 13.1 Demonstrate the use of barcode scanning and RFID technology to track inventory items in a simulated supply chain scenario. LLO 13.2 Demonstrate the use of a basic barcode system to check in and check out books in a simulated institute library setup.	13	Barcode and RFID Applications in Inventory Tracking	2	CO4
LLO 14.1 Identify the key elements of a sustainable supply chain by reviewing case studies. LLO 14.2 Identify eco-friendly practices in logistics, procurement, and production.	14	Green and Sustainable Supply Chains Practices.	2	CO1 CO5
LLO 15.1 Identify the key features of AI-powered chatbots used in supply chain management by reviewing a chatbot interface in the lab. LLO 15.2 Demonstrate the application of AI in logistics tracking by using a simulated AI-based system to monitor a shipment in the lab.	15	*AI and Chatbots Role in Logistics.	2	CO1 CO3 CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Assignment

- Case studies: SCM in automotive and machinery industries, e-commerce service sector, pharmaceutical business, etc.
- Analysis of Green and Sustainable Supply Chains.
- Role of Artificial Intelligence (AI) in Modern SCM.
- Comparative Study of ERP Systems for SCM.
- Case Study on Supply Chain Disruptions and Risk Management.
- Procurement and Inventory Management in an E-commerce Supply Chain.
- Comparative Study of Distribution Network Designs in Different Industries
- Case Study: Analyze the role of IoT in enhancing supply chain management operations through research and a practical case study. (Analyze a real-world example of a company using IoT in its supply chain (e.g., Amazon's use of IoT for warehouse management, or a logistics company using IoT for fleet tracking). Discuss the specific IoT technologies used (e.g., sensors, smart devices) and their impact on efficiency, cost, and transparency.)

Industrial Visit

- Industrial visit to manufacturing plant or service based industries to observe SCM.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of

microprojects, assignments, and activities in a similar way.

- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Open-source ERP Software's	6,12,13,16
2	Institute Workshop, Laboratories, Student Cooperative society, library, etc	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Fundamentals of Supply Chain Management	CO1	12	4	6	4	14
2	II	Supply Chain Network Planning & Design	CO2	12	4	4	6	14
3	III	Procurement, Logistics and Inventory Management	CO3	16	4	8	6	18
4	IV	Technologies in SCM	CO4	10	4	4	4	12
5	V	Emerging Trends in SCM	CO5	10	4	4	4	12
Grand Total				**60**	**20**	**26**	**24**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two-unit tests of 30 marks and average of two-unit tests.
- For laboratory learning 25 Marks

Summative Assessment (Assessment of Learning)

- End semester assessment of 25 marks for laboratory learning.
- End semester assessment of 70 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	-	-	-	-	3	-			
CO2	3	2	3	1	-	3	-			

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CO3	3	1	1	-	-	3	-			
CO4	3	1	1	2	-	3	1			
CO5	3	-	-	1	1	3	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Sunil Chopra , Peter Meindl	Supply Chain Management Strategy, Planning, and Operation	Pearson Education ,England,2016 ISBN 13: 9781292093567
2	Martin Christopher	Logistics And supply Chain Management	Pearson Education, England, 2015, ISBN 0273681761
3	J. R. Tony Arnold, Stephen N. Chapman	Introduction to Materials Management	Pearson Education ,England,2008, ISBN-13: 9780132337618 ISBN-10: 0132337614
4	Robert M. Monczka , Robert B. Handfield	Purchasing And Supply Chain Management	South-Western Cengage Learning,2009, ISBN-13: 9780324381344 ISBN-10: 0324381344
5	Michael Hugos	Essentials of Supply Chain Management	S. Chand Limited, New Delhi, 2022, ISBN: 978-93-550-1054-4
6	Robert B. Handfield & Ernest L. Nichols	Introduction to Supply Chain Management	Tata McGraw-Hill, New Delhi, ISBN: 978-1-25-900619-7
7	F. Robert Jacobs, Richard B. Chase	Operations and Supply Chain Management	McGraw-Hill Education, 2020, ISBN-13: 9781260238907

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://onlinecourses.nptel.ac.in/noc24_me63/pr view	NPTEL Course on Supply Chain Management
2	https://iimm.org/emerging-trends-in-supply-chain-management/	Emerging Trends In Supply Chain Management
3	https://onlinecourses.nptel.ac.in/noc24_hs128/preview	Logistics & Supply Chain Management
4	https://www.youtube.com/watch?v=KhoK4tSOvMM	Introduction of Supply Chain Management
5	https://onlinecourses.nptel.ac.in/noc22_mg74/preview	Operations and supply chain management

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students