BASAVESHWAR ENGINEERING COLLEGE, BAGALKOTE

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING

COURSE PLAN

Title of the Course	**:**	**Marketing Management**	**Course Code**	**:**	**UIP012E**
Credits	**:**	**03**	**Contact Hours/ Week**	**:**	**3 (3-0-0)**
Total Hours	**:**	**40**	**Tutorial Hours**	**:**	**00**
CIE Marks	**:**	**50**	**SEE Marks**	**:**	**50**
Semester	**:**	**V**	**Year**	**:**	**2023-24**
Name and Signature of the Faculty	**:**	**Dr.C.M.Javalagi**	**Name and Signature of Head of the Department**	**:**	**Dr.C.M.Javalagi**

1. Prerequisites: NIL

2. Course Objectives:

The Course objectives are:	
2.1	To understand marketing realities in the new era and conduct market research
2.2	To analyze consumer and business markets
2.3	To design product and service strategy
2.4	To demonstrate the need for retailing, wholesaling, and market logistics
2.5	To design a pricing strategy and mass communication programs in marketing

3. Course Outcomes:

At the end of the course the student should be able to:	
3.1	Discuss marketing for the new realities and design a market research program for products and services
3.2	Identify market segments and analyse consumer markets and business markets
3.3	Analyze the importance of product and service strategy in marketing
3.4	Demonstrate the need for retailing, wholesaling, and market logistics
3.5	Identify and adopt pricing strategy and mass communication program in marketing

4. Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Program Outcomes / Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
		Engineering knowledge	Problem analysis	Design/development of solutions:	Conduct investigations of complex Problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	The Industrial and Production Engineering Graduates will be able to effectively design, implement, improve and manage systems	Use the knowledge and skills of industrial engineering to model and analyze the real life problems to develop solutions	Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices
1	Discuss marketing for the new realities and design a market research program for products and services.		3	3	3	3								3	3	
2	Identify market segments and analyze consumer markets and business markets.			3	2	3								2		
3	Analyze the importance of product and service strategy in marketing			3			2	2						3		
4	Demonstrate the need for retailing, wholesaling, and market logistics				3		3							2		
5	Identify and adopt pricing strategy and mass communication program in marketing			3	3						3			3		

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

5. Competencies Addressed in the course and Corresponding Performance Indicators

5.1 Programme Outcome: Any of 1 to 12 PO's:

PO	Competency (CA)	Performance Indicators (PI)
PO2	**2.1: Demonstrate an ability to identify and formulate complex engineering problem**	**2.1.1:** Articulate problem statements and identify objectives **2.1.2:** Identify engineering systems, variables, and parameters to solve the problems
	2.2: Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	**2.2.2:** Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions **2.2.3:** Compare and contrast alternative solution processes to select the best process.
	2.3: Demonstrate an ability to formulate and interpret a model	**2.3.1:** Combine scientific principles and engineering concepts to formulate model/s (mathematical or otherwise) of a system or process that is appropriate in terms of applicability and required accuracy. **2.3.2:** Identify assumptions (mathematical and physical) necessary to allow modeling of a system at the level of accuracy required.
	2.4: Demonstrate an ability to execute a solution process and analyze results	**2.4.1:** Apply engineering mathematics and computations to solve mathematical models Produce and validate results through skillful use of contemporary engineering tools and models **2.4.3:** Extract desired understanding and conclusions consistent with objectives and limitations of the analysis
PO3	**3.1: Demonstrate an ability to define a complex/ open-ended problem in engineering terms**	**3.1.1:** Recognize that need analysis is key to good problem definition **3.1.4:** Explore and synthesize engineering requirements considering health, safety risks, environmental, cultural and societal issues **3.1.5:** Determine design objectives, functional requirements and arrive at specifications
	3.2: Demonstrate an ability to generate a diverse set of alternative design solutions	**3.2.1:** Apply formal idea generation tools to develop multiple engineering design solutions **3.2.2:** Build models/prototypes to develop a diverse set of design solutions **3.2.3:** Identify suitable criteria for the evaluation of alternate design solutions
	3.3: Demonstrate an ability to select an optimal design scheme for further development	**3.3.1:** Apply formal decision-making tools to select optimal engineering design solutions for further development
PO4	**4.1: Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding**	**4.1.1:** Define a problem, its scope and importance for purposes of investigation **4.1.3:** Apply appropriate instrumentation and/or software tools to make measurements of physical quantities **4.1.4:** Establish a relationship between measured data and underlying physical principles.
	4.3 Demonstrate an ability to analyze data and reach a valid conclusion	**4.3.1:** Use appropriate procedures, tools, and techniques to conduct experiments and collect data **4.3.2**: Analyze data for trends and correlations, stating possible errors and limitations **4.3.3:** Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions **4.3.4:** Synthesize information and knowledge about the

PO	Competency (CA)	Performance Indicators (PI)
		problem from the raw data to reach appropriate conclusions
PO5	**5.1 Demonstrate an ability to identify/ create modern engineering tools, techniques and resources**	**5.1.1:** Identify modern engineering tools such as computer-aided drafting, modeling and analysis; techniques and resources for engineering activities **5.1.3:** Create/adapt/modify/extend tools and techniques to solve industrial engineering problems
	5.3 Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	**5.3.1:** Discuss limitations and validate tools, techniques and resources **5.3.2:** Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
PO6	**6.1 Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare**	**6.1.1:** Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at the global, regional and local level
	6.2 Demonstrate an Understanding of professional Engineering regulations, legislation and standards	**6.2.1:** Interpret legislation, regulations, codes, and standards relevant to your discipline and explain its contribution to the protection of the public
PO7	**7.1 Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts**	**7.1.1:** Identify risks/impacts in the life-cycle of an engineering product or activity **7.1.2:** Understand the relationship between the technical, socio-economic and environmental dimensions of sustainability
	7.2 Demonstrate an ability to apply principles of sustainable design and development	**7.2.1:** Describe management techniques for sustainable development **7.2.2:** Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to industrial and production engineering discipline
PO10	**10.1 Demonstrate an ability to comprehend technical literature and document project work**	**10.1.1**: Read, understand and interpret technical and non-technical information **10.1.2:** Produce clear, well-constructed, and well-supported written engineering documents **10.1.3**: Create flow in a document or presentation - a logical progression of ideas so that the main point is clear
	10.2 Demonstrate competence in listening, speaking, and presentation	**10.2.1**: Listen to and comprehend information, instructions, and viewpoints of others **10.2.2:** Deliver effective oral presentations to technical and non-technical audiences
	10.3 Demonstrate the ability to integrate different modes of communication	**10.3.1**: Create engineering-standard figures, reports and drawings to complement writing and presentations **10.3.2**: Use a variety of media effectively to convey a message in a document or a presentation

6. Course Content

Hours Required	Topic to be covered	Mode of Delivery
	UNIT-I	
		Chalk and talk in classroom/Lecture combined with discussions/ PPT/ Case Studies
01	**Defining marketing for the new realities**: The value of marketing, the Scope of Marketing,	
01	Core marketing concepts, the new marketing realities	
01	Company Orientation towards the marketplace.	
01	**Collecting Information:** Components of modern marketing information system, Internal records, marketing intelligence,	
01	Analyzing the macro environment	
01	**Conducting Marketing Research:** The scope of Marketing research	
01	The Marketing research process	
01	The Marketing research process	
01	The Marketing research process	
01	The Seven Characteristics of good marketing research	
	UNIT-II	
01	**Analyzing Consumer Markets:** What influences consumer behavior? Key psychological processes	Chalk and talk in classroom/Lecture combined with discussions/ PPT/ Case Studies
01	The buying decision process: Five-stage model	
01	Behavioral Decision Theory, and Behavioral Economics	
01	**Identifying Market Segments and Targets:** Basis for segmenting consumer markets	
01	How should business markets be segmented?	
01	Market targeting, Effective segmentation criteria.	
01	**Analyzing Business Markets:** What is organizational buying?	
01	Participants in the business buying process, the purchasing/procurement process	
01	Stages in the buying process, Developing Effective-business-to- business marketing programs	
01	Managing business-to-business customer relationships, and Institutional & Government markets.	
	UNIT-III	
01	**Setting Product Strategy:** Product characteristics and classifications	Chalk and talk in classroom/Lecture combined with discussions/ PPT/ Case Studies
01	Differentiation	
01	Environmental issues Product and brand relationships	
01	Packaging, Labelling, warranties, and guarantees	
01	**Designing and Managing services**: The nature of services	
01	The nature of services….. *Contd.*	
01	The new services realities	
01	Achieving excellence in services marketing	
01	**Managing retailing, Wholesaling and Logistics:** Retailing, private labels	
01	wholesaling, market logistics	
	UNIT-IV	
01	**Developing Pricing strategies and programs:** Understanding pricing	Chalk and talk in classroom/Lecture combined with discussions/ PPT/ Case Studies
01	Setting the price, Adapting the price	
01	Initiating and responding to price changes	
01	**Designing and Managing Integrated marketing communications:** The role of marketing communications	
01	Marketing communications mix	

Hours Required	Topic to be covered	Mode of Delivery
01	How do marketing communications work	
01	Developing effective communications	
01	Selecting the marketing communications mix	
01	Developing and managing an advertising programme	
01	Developing and managing an advertising programme…. *Contd.*	

7. Review Questions:

No	Review Questions	CO	BLL	PI addressed
	UNIT-I			
1.	Define the term marketing. What is marketed? Explain any two of them	1	L2	2.1.1
2.	What is the scope of marketing? Explain.	1	L2	2.1.1
3.	Match the statements in column "A" to column "B" **A** / **B** Marketing / The consumer learns about competing brands Marketer / Core marketing concept Search dynamics / Someone who seeks a response Aspirational groups / Meeting needs profitably Supply chain / Person hopes to join	1	L2	2.1.1
4.	Name core marketing concepts. Explain any two of them	1	L2	3.1.1
5.	Draw a neat block diagram for the structure of flows in a modern exchange economy	1	L1	2.1.1
6.	How do the new marketing realities influence marketing?	1	L3	2.1.2
7.	Name and explain with an example the company's orientation towards the marketplace.	1	L3	2.1.1
8.	Define and explain the marketing information system.	1	L1	3.1.1
9.	Briefly explain internal records and marketing intelligence.	1	L2	3.1.1
10.	Name the components of the macroenvironment. Explain them in brief.	1	L3	4.1.1
11.	Briefly explain the scope of marketing research	1	L2	4.1.2
12.	Draw a neat block diagram for the marketing research process.	1	L2	4.1.1
13.	Explain the components of the marketing research process	1	L2	3.2.2
14.	Name any five types of close-ended questions used in designing a questionnaire for marketing research.	1	L2	3.2.1
15.	Name and explain the characteristics of a good marketing research	1	L2	3.2.1
	UNIT-II			
1	Name and explain the factors influencing consumer behaviours.	2	L2	3.1.1
2	Draw and explain the model of consumer behaviours	2	L2	3.2.1
3	Explain the following terms: i) Selective attention ii) Selective retention iii) Selective distortion	2	L2	3.2.1
4	Draw a neat block diagram for a five-stage model of the consumer buying process. Explain any one step in detail.	2	L2	3.1.1
5	Your brother has got his first salary and he wishes to buy a mobile for you as a gift. Design a five-stage buying decision process model to help him to get the best mobile for you	2	L6	3.2.1
6	Explain Maslow's hierarchy of needs theory as an influence on consumer response.	2	L2	9.1.1

No	Review Questions	CO	BLL	PI addressed
7	What are the findings of behavioural decision theory?	2	L2	9.1.2
8	Name and explain the basis for consumer market segmentation.	2	L2	4.1.2
9	How should business markets be segmented?	2	L2	4.1.2
10	What are the steps in the segmentation process?	2	L2	4.1.2
11	What is organizational buying?	2	L2	3.1.1
12	Differentiate between the business market versus the consumer market.	2	L3	5.1.1
13	What are buying situations? Explain with the help of an example.	2	L2	3.1.1
14	Explain the concept of buying center.	2	L2	3.1.1
15	Name and explain the stages in the buying decision process.	2	L2	3.1.2
16	Classify any Ten of the following buying categories according to their "buying situations": 1. Custom-made CNC machine 2. New Production centre at Bagalkot 3. Replacement of computers 4. Papers for office use 5. Vehicles for company managers 6. Bulk chemicals 7. Common Nuts and bolts 8. Hiring of a consultant to help company employees 9. Weapons for Defence ministry 10. Soaps and detergents for company use 11. A transformer which is burnt in the company 12. Modern furniture for CEO chamber	2	L3	5.1.1
17	Write a note on developing an effective business-to-business marketing program	2	L2	5.1.1
18	What are institutional and government markets? Explain	2	L2	5.1.2
	UNIT-III			
1	Demonstrate how products can be classified in five product levels	3	L3	6.1.1
2	Write a brief note on product classification.	3	L2	6.1.1
3	Explain how products can be differentiated	3	L3	3.1.5
4	Explain how services can be differentiated	3	L3	3.1.5
5	Enumerate the importance of environmental issues in product-related activities	3	L2	7.1.1
6	Explain with the example the product hierarchy	3	L3	6.1.1
7	Define the terms i) Product System ii) Product mix iii) Width of a product mix iv) length of a product v) Depth of a product mix vi) consistency of the product mix	3	L2	3.1.1
8	Draw a neat diagram for the product mix and product line length of a chosen company.	3	L3	3.1.1
9	Mr. Ranbir is appointed as a product line manager for LOVELY MOTORS, Pune, which is in the business of motor cycles. Motor cycles are manufactured in various ranges of engine capacities like, upto 125cc, 125-250 cc, 250-350 cc, and above 350 cc. In each of these ranges motors cycles are offered in low, medium and high quality and features. Competitor A has 4 products, two each, in 125-250cc & 250-350 cc and Low and High quality features. Competitor B has 3 products, with 250-350cc engine capacity and low, medium, High quality and features.	3	L3	3.1.1

No	Review Questions	CO	BLL	PI addressed
	Competitor C has 4 products, two each in upto 125cc & above 350 cc low and medium quality features. Develop a product map for Mr. Varun to help him to introduce new products for LOVELY MOTORS.			
10	Define packaging and labelling. Explain anyone.	3	L2	3.2.1
11	Write a brief note on warranties, and guarantees	3	L2	3.2.1
12	Explain packaging with its advantages	3	L2	3.2.1
13	Name categories of service mix. Explain anyone.	3	L2	6.1.1
14	What are the distinctive characteristics of services? Explain anyone.	3	L2	6.1.1
14	Brief explain the new service realities.	4	L2	6.1.1
15	Explain how excellence is achieved in service marketing?	3	L3	6.1.1
16	Define retailing. Name and briefly explain major types of store retailers	4	L2	3.1.1
17	What is wholesaling? Explain the functions of wholesalers.	4	L2	3.1.1
	UNIT-IV			
1	Name the major objectives of pricing. Explain anyone	5	L2	3.1.1
2	Define the following i) Mark-up pricing ii) Value pricing iii) Target return pricing iv) Going rate pricing v) Perceived-value pricing	5	L4	4.1.1
3	Name the steps involved in setting a pricing policy	5	L2	4.1.1
4	Write a brief note on consumer psychology and pricing.	5	L2	3.1.1
5	Name the steps involved in setting a pricing policy.	5	L2	4.1.1
6	Define marketing communications. Explain the marketing communications environment.	5	L2	10.1.1
7	What are the modes of marketing communications mix? Explain	5	L2	10.2.1
8	Explain how marketing communications work.	5	L3	10.1.1
9	Write a note on developing effective communications	5	L2	10.1.3
10	Explain how the marketing communications mix is selected.	5	L3	10.2.2
11	Discuss with a neat sketch five M's of advertising	5	L2	10.1.1
12	Write a note on major media types	5	L2	10.1.2

8. Representative Case-Studies:

8.1 Reinventing Marketing at >>Coca-Cola:

Coca-Cola is fundamentally changing the way it does marketing, primarily by adding a strong digital component to its traditional marketing tools. The new model is based on moving consumers from impressions to expressions to conversations to transactions. Coca-Cola defines consumer expressions as any level of engagement with brand content: a comment, "like," or share on Facebook, a Tweet, or an uploaded photo or video. Coca-Cola strives to put strongly sharable pieces of communication online that will generate impressions but also lead to expressions from consumers who join or extend the communication storyline and ultimately buy the product.

These communications focus on the core themes of “happiness” and “optimism” that define the brand’s positioning. One successful application is the video of the “Hug Me” vending machine in Singapore that dispensed cans of Coke when people put their arms around it and hugged it. Within a week, the video generated 112 million impressions.

Coca-Cola actively experiments, allocating 70 percent of its budget to activities it knows will work, 20 percent to improving those activities, and 10 percent to experimentation. The company accepts that experiments can fail but believes in taking chances to learn and develop better solutions. Even in its traditional advertising and promotion, it looks for innovation.

For instance, Coca-Cola places much importance on cultural leadership and causes that benefit others. The mission of its Artic Home project is to protect the habitat of polar bears—who have starred in animated form in its holiday ads for years. Committing $3 million to the World Wildlife Fund, Coca-Cola drew attention to the project by turning its traditional red cans white.

8.2 Marketing Excellence >> Nike

Nike hit the ground running in 1962. Originally known as Blue Ribbon Sports, the company focused on providing high-quality running shoes designed for athletes by athletes. Founder Philip Knight believed high-tech shoes for runners could be manufactured at competitive prices if imported from abroad. Nike’s commitment to designing innovative footwear for serious athletes helped build a cult following among U.S. consumers.

Nike believed in a “pyramid of influence” where the preferences of a small percentage of top athletes influenced the product and brand choices of others. Nike’s marketing campaigns have always featured accomplished athletes. For example, runner Steve Prefontaine, the company’s first spokesperson, had an irreverent attitude that matched Nike’s spirit.

In 1985, Nike signed up then-rookie guard Michael Jordan as a spokesperson. Jordan was still an up-and-comer, but he personified superior performance. Nike’s bet paid off—the Air Jordan line of basketball shoes flew off the shelves and revenues hit more than $100 million in the first year alone. As one reporter stated, “Few marketers have so reliably been able to identify and sign athletes who transcend their sports to such great effect.”

In 1988, Nike aired the first ads in its $20 million “Just Do It” ad campaign. The campaign, which ultimately featured 12 TV spots in all, subtly challenged a generation of athletic enthusiasts to chase their goals. It was a natural manifestation of Nike’s attitude of self-empowerment through sports.

As Nike began expanding overseas, the company learned that its U.S.-style ads were seen as too aggressive in Europe, Asia, and South America. Nike realized it had to “authenticate” its brand in other countries, so it focused on soccer (called football outside the United States) and became active as a sponsor of youth leagues, local clubs, and national teams. However, for Nike to build authenticity among the soccer audience, consumers had to see professional athletes using its product, especially athletes who won.

Nike’s big break came in 1994 when the Brazilian team (the only national team for which Nike had any real sponsorship) won the World Cup. That victory transformed Nike’s international image from a sneaker company into a brand that represented emotion, allegiance, and identification. Nike’s new alliance with soccer helped propel the brand’s growth internationally. In 2003, overseas revenues surpassed U.S. revenues for the first time, and in 2007, Nike acquired Umbro, a British maker of soccer-

related footwear, apparel, and equipment. The acquisition made Nike the sole supplier to more than 100 professional soccer teams around the world and boosted Nike's international presence and authenticity in soccer. The company sold Umbro in 2012 for $225 million.

In recent years, Nike's international efforts have been focused on emerging markets. During the 2008 Summer Olympics in Beijing, Nike honed in on China and developed an aggressive marketing strategy that countered Adidas's sponsorship of the Olympic Games. Nike received special permission from the International Olympic Committee to run Nike ads featuring Olympic athletes during the games. In addition, Nike sponsored several teams and athletes, including most of the Chinese teams. This aggressive sponsorship strategy helped ignite sales in the Asian region by 15 percent.

In addition to expanding overseas, Nike has successfully expanded its brand into many sports and athletic categories, including footwear, apparel, and equipment. Nike continues to partner with high-profile and influential athletes, coaches, teams, and leagues to build credibility in these categories. For example, Nike aligned with tennis stars Maria Sharapova, Roger Federer, and Rafael Nadal to push its line of tennis clothing and gear. Some called the famous 2008 Wimbledon match between Roger Federer and Rafael Nadal—both dressed in swooshes from head to toe—a five-hour Nike commercial valued at $10.6 million.

To promote its line of basketball shoes and apparel, Nike has partnered with basketball superstars such as Kobe Bryant and LeBron James. In golf, Nike's swoosh appears on many golfers but most famously on Tiger Woods. In the years since Nike first partnered with Woods, Nike Golf has grown into a $523 million business and literally changed the way golfers dress and play today.

Tiger's powerful influence on the game and his Nike-emblazoned style has turned the greens at the majors into "golf's fashion runway." Nike is the biggest sponsor of athletes in the world and plans to spend more than $3 billion in athletic endorsements between 2012 and 2017. The company also has a history of standing by its athletes, such as Tiger Woods and Kobe Bryant, even as they struggle with personal problems. It severed its relationship with Lance Armstrong in 2012, however, after strong evidence showed that the cyclist doped during his time as an athlete and while competing during all Tour de Frances. Nike released a statement explaining, "Nike does not condone the use of illegal performance enhancing drugs in any manner." Prior to the scandal, the company had helped develop Armstrong's LIVESTRONG campaign to raise funds for cancer. It designed, manufactured, and sold more than 80 million yellow LIVESTRONG bracelets, netting $500 million for the Lance Armstrong Foundation.

While Nike's athletic endorsements help inspire and reach consumers, its most recent innovations in technology have resulted in more loyal and emotionally connected consumers. For example, Nike's lead in the running category has grown to 60 percent market share thanks to its revolutionary running application and community called Nike+ (plus). Nike+ allows runners to engage in the ultimate running experience by seeing their real-time pace, distance, and route and by giving them coaching tips and online sharing capabilities.

Nike expanded Nike+ to focus on key growth areas like basketball and exercise and recently launched Nike+ Basketball, Nike+ Kinect, and Nike + Fuelband, a bracelet/ app that tracks daily activities.

Like many companies, Nike is trying to make its company and products more eco-friendly. However, unlike many companies, it does not promote these efforts. One brand consultant explained, "Nike has always been about winning. How is sustainability relevant to its brand?" Nike executives agree that promoting an eco-friendly message would distract from its slick high-tech image, so efforts like recycling old shoes into new shoes are kept quiet.

As a result of its successful expansion across geographic markets and product categories, Nike is the top athletic apparel and footwear manufacturer in the world. In 2014, revenues exceeded $27 billion, and Nike dominated the athletic footwear market with 31 percent market share globally and 50 percent market share in the United States. Swooshes abound on everything from wristwatches to skateboards to swimming caps. The firm's long-term strategy, however, is focused on running, basketball, football/soccer, men's training, women's training, and action sports.

8.3 Finding Gold at the Bottom of the Pyramid

Business writer C. K. Prahalad believes much innovation can come from developments in emerging markets such as China and India. He estimates 5 billion unserved and underserved people make up the "bottom of the pyramid." One study showed that 4 billion people live on $2 or less a day. Firms operating in those markets must learn how to do more with less.

In Bangalore, India, Narayana Hrudayalaya Hospital charges a flat fee of $1,500 for heart bypass surgery that costs 50 times as much in the United States. The hospital has low labor and operating expenses and an assembly-line view of care. The approach works—the hospital's mortality rates are half those of U.S. hospitals. Narayana also operates on hundreds of infants for free and profitably insures 2.5 million poor Indians against serious illness for 11 cents a month.

Similarly, Arvind Eye Care System, established by Govindappa Venkatswamy in 1976 in India, has performed 4 million operations using an approach likened to "McDonald's-style" high-volume assembly. Aravind also developed an intra-ocular lens, manufactured by its subsidiary, Aurolab, at a fraction of the cost of imports. Sala Uno, a for-profit social enterprise based in San Francisco, replicated the Aravind model in Mexico, carrying out 133 cataract operations a month for a year—free of charge for those who could not afford the treatment.

The transfer of innovations from developing to developed markets is what Dartmouth professor Vijay Govindrajan calls reverse innovation. He sees opportunity in focusing on the needs and constraints of a developing market to create an inexpensive product that can succeed there and then introducing it as a cheaper alternative in developed markets. He also sees reverse innovation's public policy benefits, which can transform industries through the successful development of ultra-low-cost transportation, renewable energy, clean water, micro finance, affordable health care, and low-cost housing.

Among successful reverse innovators, Nestlé repositioned its low-fat Maggi brand dried noodles—a popular, low-priced meal for rural Pakistan and India—as a budget-friendly health food in Australia and New Zealand. U.S.-based Harman International, known for high-end dashboard audio systems designed by German engineers, developed a radically simpler and cheaper way to create products for China, India, and emerging markets and is applying that method to its product-development centers in the West. It now can sell a range of products priced from low to high and is looking into infotainment systems for motorbikes, a popular form of transportation in emerging markets and around the world.

8.4 Marketing Excellence >> IDEO

IDEO is the largest and one of the most influential design consultancy firms in the United States. The company has created many recognizable design icons of the technology age, including the first laptop computer, the first mouse for Apple, the Palm V PDA, and the TiVo digital video recorder. Beyond its high-tech wizardry, the company has designed revolutionary household items such as the Swiffer Sweeper and Crest's stand-up toothpaste tube, both for Procter & Gamble. IDEO's diverse roster of

clients includes AT&T, Bank of America, Ford Motor Company, PepsiCo, Nike, Marriott, Caterpillar, Eli Lilly, Lufthansa, Prada, and the Mayo Clinic.

IDEO's success is predicated on an approach called "design thinking"—an innovative method that incorporates behavior into design. It's an unconventional way of problem solving and starts by forming teams of individuals with various backgrounds and experiences. Team members range from anthropologists and journalists to MBAs and engineers. IDEO's belief is that if you bring together a diverse group with these talents, they will build upon each other's ideas and come up a solution that one mind cannot reach alone.

Next, IDEO uses different methods of behavioral research and observation to get into the mind of the consumer. This helps IDEO uncover deep insights and understand how consumers purchase, interact with, use, and even dispose of products. For example, one method shadows consumers, takes pictures or videos of them during product purchase or use occasions, and conducts in-depth interviews with them to further evaluate their experiences. IDEO uses another method called behavioral mapping and maintains a photographic log of people within a certain area like an airline departure lounge, a hospital waiting room, or a food court to gauge how the experience can be improved. Participants keep a "camera journal" in which they record their visual impressions of a given product or category. IDEO also invites consumers to use storytelling techniques and share personal narratives, videos, skits, or even animations about their experiences with a product or service.

IDEO's human-centered approach runs counter to the prevailing wisdom of many high-tech firms that focus more on their own capabilities when designing products. David Blakely, head of IDEO's technology group, explained, "Tech companies design from the inside out, whereas we design from the outside in so that we can put customers first." Ultimately, the company designs products that consumers want and value because they offer a superior experience and solve a problem. Recent product innovations include a heart defibrillator that talks with instructions during an emergency and a renovated version of the classic wooden classroom chair.

Marriott hired IDEO to help make its Courtyard by Marriott hotels more appealing to younger guests. IDEO conducted interviews and observed guests in the hotel's lounges, lobbies, and restaurants. Its research revealed that younger guests were turned off by the lack of activity in the hotel's public places, the lack of technology offered, and poor food options. As a result, Courtyard by Marriott updated its furniture and decor to be more comfortable and inviting. The hotel added advanced technology options throughout its lobbies and lounges, such as flat-screen TVs and free Wi-Fi. Marriott converted its breakfast buffets to 24/7 coffee-shop-style cafés, where guests could quickly grab a gourmet coffee drink and healthy bite to eat anytime. Courtyard even created new outdoor hangout spots with sound speakers and fire pits. After the renovations, the chain changed its tagline to "Courtyard. It's a New Stay."

Prototyping takes place throughout IDEO's design process so individuals can physically test out the product, experience it, and improve upon it during each level of development. IDEO encourages its clients, even senior executives, to participate in the research so they get a sense of the actual consumer experience with their product or service. For example, when it created a prototype for Apple's first mouse, Steve Jobs didn't like the sound it made when it moved around on a desk and insisted that IDEO find a way to reduce the noise. The design firm overcame this huge technical obstacle and successfully rubber-coated the steel ball without interfering with its function.

IDEO's novel consumer-led approach to design has generated countless success stories and awards for the firm and its clients. Its work has also served as inspiration for the creation of Stanford University's design school— The Hasso Plattner Institute of Design—where students

work on problem-solving centered around design thinking.

The most important result for IDEO is that its designs solve a usability problem for clients. The company goes broad and deep to achieve this goal. Since its founding, it has been issued thousands of patents and generated hundreds of millions in revenues.

Questions

1. Why has IDEO been so successful?
2. What is the most difficult challenge it faces in conducting its research and designing its products?
3. In the end, IDEO creates great solutions for companies that then receive all the credit. Should IDEO try to create more brand awareness for itself? Why or why not?

8.5 Marketing Excellence >>Disney

Few companies have been able to connect with their audience as well as Disney has. From its founding by brothers Walt and Roy Disney in 1923, the Disney brand has always been synonymous with trust, fun, and quality entertainment for the entire family. Walt Disney once stated, "I am interested in entertaining people, in bringing pleasure, particularly laughter, to others, rather than being concerned with 'expressing' myself with obscure creative impressions."

The Walt Disney Company has grown into the worldwide phenomenon that today includes theme parks, feature films, television networks, theatre productions, consumer products, and a growing online presence. In its first two decades, however, it was a struggling cartoon studio that introduced the world to Mickey Mouse, who went on to become its most famous character.

Few believed in Disney's vision at the time, but the smashing success of cartoons with sound and of the first full-length animated film, Snow White and the Seven Dwarfs, in 1937 led to other animated classics throughout the 1940s, 1950s, and 1960s, including Pinocchio, Bambi, Cinderella, and Peter Pan, live-action films such as Mary Poppins and The Love Bug, and television series like Davy Crockett.

When Walt Disney died in 1966, he was considered the best-known person in the world. He had expanded the Disney brand into film, television, consumer products, and Disneyland in southern California, the company's first theme park. After Walt's death, Roy Disney took over as CEO and realized his brother's dream of opening the 24,000-acre Walt Disney World theme park in Florida. Roy died in 1971, and the company stumbled for several years without the leadership of its two founding brothers. It wasn't until the late 1980s that the company reconnected with its audience and restored trust and interest in the Disney brand. It all started with the release of The Little Mermaid, which turned an old fairy tale into a magical animated Broadway-style movie that won two Oscars. Between the late 1980s and 2000, Disney entered an era known as the Disney Renaissance as it released ground-breaking animated films such as Beauty and the Beast (1991), Aladdin (1992), The Lion King (1994), Toy Story (with Pixar, 1995), and Mulan (1998). In addition, the company thought of creative new ways to target its core family oriented consumers as well as expand into new areas to reach an older audience. It launched the Disney Channel, Touchstone Pictures, and Touchstone Television. Disney featured classic films during The Disney Sunday Night Movie and sold its classic films on video at extremely low prices, reaching a whole new generation of children. It tapped into publishing, international theme parks, and theatrical productions that helped reach a variety of audiences around the world.

Today, Disney consists of five business segments: Studio Entertainment, which creates films, recording labels, and theatrical performances; Parks and Resorts, which focuses on Disney's 11 theme parks, cruise

lines, and other travel-related assets; Consumer Products, which sells all Disney-branded products; Media Networks, which includes Disney's television networks such as ESPN, ABC, and the Disney Channel; and Interactive.

Disney's greatest challenge today is keeping a 90-year-old brand relevant and current with its core audience while staying true to its heritage and core brand values. Disney's CEO Bob Iger explained, "As a brand that people seek out and trust, it opens doors to new platforms and markets, and hence to new consumers. When you deal with a company that has a great legacy, you deal with decisions and conflicts that arise from the clash of heritage versus innovation versus relevance. I'm a big believer in respect for heritage, but I'm also a big believer in the need to innovate and the need to balance that respect for heritage with a need to be relevant."

Internally, to achieve quality and recognition, Disney has focused on the Disney Difference, which stems from one of Walt Disney's most recognizable quotes: "Whatever you do, do it well. Do it so well that when people see you do it they will want to come back and see you do it again and they will want to bring others and show them how well you do what you do."

Disney works hard to connect with its customers on many levels and through every single detail. For example, at Disney World, "cast members" or employees are trained to be "assertively friendly" and greet visitors by waving big Mickey Mouse hands, hand out maps to adults and stickers to kids, and clean up the park so diligently that it's difficult to find a piece of garbage anywhere.

Every detail matters, right down to the behavior of custodial workers who are trained by Disney's animators to take their simple broom and bucket of water and quietly "paint" a Goofy or Mickey Mouse in water on the pavement. It's a moment of magic for guests that lasts just a minute before it evaporates in the hot sun.

Disney's broad range of businesses allows the company to connect with its audience in multiple ways, efficiently and economically. Hannah Montana provides an excellent example. The company took a tween-targeted television show and moved it across several divisions to become a significant franchise for the company, including millions of CD sales, video games, popular consumer products, box office movies, concerts around the world, and ongoing live performances at international Disneyland resorts in Hong Kong, India, and Russia.

Recently, Disney acquired three huge brands: Pixar, Marvel, and Lucas Films. The company has started to leverage these properties, which include the Star Wars brand and superheroes such as Spiderman, Iron Man, and the Hulk, across many of its businesses in order to create sustainable character brands and new growth opportunities for the company.

Perhaps the most anticipated new product of 2013 was the Disney Infinity gaming platform, which crossed all Disney boundaries. Disney Infinity allowed consumers to play with many of the Disney characters at the same time, interacting and working together on different adventures.

For example, Andy from Toy Story might join forces with Captain Jack Sparrow from Pirates of the Caribbean and several monsters from Monsters, Inc. to fight villains from outer space.

With so many brands, characters, and businesses, Disney uses technology to ensure that a customer's experience is consistent across every platform. The company connects with its consumers in innovative ways through e-mail, blogs, and its Web site. It was one of the first companies to begin regular podcasts of its television shows as well as to post news about its products and interviews with Disney's employees, staff, and park officials.

Disney's Web site provides insight into its movie trailers, television clips, Broadway shows, and virtual theme park experiences. Disney's marketing campaign in recent years has focused on how it helps make unforgettable family memories.

The campaign, "Let the Memories Begin," features real guests throughout Disney enjoying different rides and magical experiences. Leslie Ferraro, executive vice president of global marketing, Disney Destinations, elaborated, "The inspiration for this effort came from our guests. Each and every day people are making memories at our parks, posting them online and sharing them with friends and family."

According to internal studies, Disney estimates that consumers spend 13 billion hours "immersed" with the Disney brand each year. Consumers around the world spend 10 billion hours watching programs on the Disney Channel, 800 million hours at Disney's resorts and theme parks, and 1.2 billion hours watching a Disney movie—at home, in the theatre, or on their computer. Today, Disney is the 13th most powerful brand in the world, and its revenues topped $45 billion in 2013.

Questions

1. What does Disney do best to connect with its core consumers?
2. What are the risks and benefits of expanding the Disney brand in new ways, such as video games or superheroes?

8.6 Marketing Excellence >> IKEA

IKEA was founded in 1943 by a 17-year-old Swede named Ingvar Kamprad who sold pens, Christmas cards, and seeds out of a shed on his family's farm. The name IKEA was derived from Kamprad's initials (IK) and the first letters of the Elmtaryd farm and the village of Agunnaryd where he grew up (EA). Over the years, the company grew into a retail titan in home furnishings and a global cultural phenomenon, inspiring BusinessWeek to call it a "one-stop sanctuary for coolness" and "the quintessential cult brand."

IKEA inspires remarkable levels of interest and devotion from its customers. Each year more than 650 million visitors walk through its stores all over the world. Most need to drive 50 miles round-trip but happily make the effort in order to experience IKEA's unique value proposition: leading-edge design and functional home furnishings at extremely low prices.

IKEA's Scandinavian-designed products are well made and appeal to the masses. To stay relevant and fashionable, the company replaces approximately one third of its product lines each year. Most have Swedish names, such as HEKTAR lamps, BILLY bookcases, and LACK side tables. Kamprad, who was dyslexic, believed it was easier to remember product names rather than codes or numbers.

Besides featuring fashionable and good-quality products, IKEA stands out in the industry because of its bargain prices. The company's vision is and always has been "to create a better everyday life for the many people." As Kamprad said, "People have very thin wallets. We should take care of their interests." A high percentage of its customers are college students and families with children.
IKEA continuously seeks out new ways to run its businesses more efficiently and pass those cost savings on to the customer. In fact, it reduces prices across its products by 1 percent to 3 percent annually. How can it do so? For starters, IKEA engages the consumer on many levels, including having the customer do all the shopping, shipping, and assembly.

IKEA's floor plan is designed in a winding, oneway format featuring different inspirational room settings, so consumers experience the entire store. Next, they can grab a shopping cart, pay for the items, visit the warehouse, and pick up their purchases in flat boxes. Consumers load the items in their car, take them home, and completely assemble the products themselves. This strategy makes storage and transportation easier and cheaper for the store.

IKEA has also implemented several company-wide strategies to keep operational costs low. The company buys in bulk, controls the supply chain, uses lighter packaging materials, and saves on electricity through solar panels, low-wattage light bulbs, and energy from its own wind farms in six different countries. Its stores are located a good distance from most city centers, which helps keep land costs down and taxes low.

When IKEA develops new products, its designers and product developers start with a low-price tag first and then work with one of their 1,350 suppliers around the world to develop the product within that price range. Designs are efficient, and waste is kept to a minimum. Most stores resemble a large box with few windows and doors and are painted bright yellow and blue—Sweden's national colors. Many of IKEA's products are sold uniformly throughout the world, but the company also caters to local and regional tastes. For example, stores in China stock specific items for each New Year. During the Chinese Year of the Rooster, IKEA stocked 250,000 plastic placemats with rooster themes, which quickly sold out. When employees realized U.S. shoppers were buying vases as drinking glasses because they considered IKEA's regular glasses too small, the company developed larger glasses for the U.S. market. After IKEA managers visited European and U.S. consumers in their homes, they learned that Europeans generally hang their clothes, whereas U.S. shoppers prefer to store them folded. As a result, IKEA designed wardrobes for the U.S. market with deeper drawers.

Showrooms in each country or region vary as well. For example, managers learned that many U.S. consumers thought IKEA sold only European-size beds. Beds are very important to U.S. consumers, so IKEA quickly changed its U.S. showrooms to feature king beds and a wide range of styles. After visiting Hispanic households in California, IKEA added more seating and dining space to its California stores, as well as brighter color palettes and more picture frames on the showroom walls. In China, IKEA set up its showrooms in small spaces to accurately reflect the small size of apartments in that country.

As the company expands globally, it is learning that attitudes towards its core DIY (do it yourself) delivery and assembly business model vary. In China, for example, consumers do not want to assemble products themselves and will pay a significant amount for home delivery and assembly. As a result, IKEA has added these services, and sales in Asia have taken off. The company plans to implement the same strategy in India, where DIY is also less common.

IKEA is known for its quirky marketing campaigns, which help generate excitement and awareness of its stores and brand. It ran a campaign inviting customers to be the "Ambassador of Kul" (Swedish for "fun"), but in order to collect the prize, the contestants had to live in an IKEA store for three full days before it opened, which they happily did.

Thousands of people will line up for a chance to win prizes and IKEA furniture. In Sweden, IKEA launched a Facebook page for the manager of a new store. Anyone who could tag his or her name to an IKEA product on the profile page won that item. The promotion generated thousands of tags.

IKEA has evolved into the largest furniture retailer in the world, with approximately 350 stores in 43 countries and revenues topping €27.9 billion, or $36 billion, in 2013. The majority of sales still come from Europe, but the company has aggressive plans to expand the $11 billion brand further into Asia, India, and the United States.

Questions

1. What are some of the things IKEA is doing well to reach consumers in different markets? What else could it be doing?
2. IKEA has essentially changed the way people shop for furniture. Discuss the pros and cons of this strategy, especially as the company plans to continue to expand in places like Asia and India.

8.7 Marketing Excellence >>GE

Thomas Edison founded the Edison Electric Light Company in 1878. The company, which soon changed its name to General Electric (GE), became an early pioneer in lightbulbs and electrical appliances and served the electrical needs of various industries, such as transportation, utilities, manufacturing, and broadcasting. GE became the acknowledged pioneer in business-to-business marketing in the 1950s and 1960s under the tagline "Progress Is Our Most Important Product."

As the company diversified its business-to-business product lines in the 1970s and 1980s, it created new corporate campaigns, including "Progress for People" and "We Bring Good Things to Life." In 1981, Jack Welch succeeded Reginald Jones as GE's eighth CEO. During Welch's two decades of leadership, he helped grow GE from an "American manufacturer into a global services giant" and increased the company's market value from $12 billion in 1981 to $280 billion in 2001, making it the world's most valuable corporation at the time.

Over the years, GE has exhibited a keen understanding of the business market and the business buying process by putting itself in the shoes of its business customers. For example, the company understands that buying an aircraft engine is a multimillion-dollar expenditure that doesn't end with the purchase. Customers (the airlines) face substantial maintenance costs to meet FAA guidelines and ensure the reliability of the engines. In 1999, GE pioneered a new pricing option called "Power by the Hour," giving customers an opportunity to pay a fixed fee each time they run the engine. In return, GE performs all the maintenance and guarantees the engine's reliability. When demand for air travel is uncertain, "Power by the Hour" provides GE's customers with a lower cost of ownership.

In 2003, GE and its new CEO, Jeffrey Immelt, faced a fresh challenge: how to promote its diversified brand with a unified global message. A source at GE explained, "(Immelt) wants advertising that's more high-tech, more innovative and contemporary. Something that will make GE look more advanced, out in front." So, after 24 years and $1 billion in financial support, GE dropped its signature slogan "We Bring Good Things to Life" for the new tagline "Imagination at Work," highlighting its renewed focus on innovation and new technology.

The award-winning new campaign promoted units such as GE Aircraft Engines, Medical Systems, and Plastics, focusing on the breadth of the company's product offerings, and it got results. "Research indicates GE is now being associated with attributes such as being high tech, leading edge, innovative, contemporary, and creative," stated Judy Hu, GE's general manager for global advertising and branding. In addition, survey respondents continued to associate GE with some of its traditional attributes, including trust and reliability.

In 2005, GE evolved the campaign into a companywide initiative that continues today, "Ecomagination." Ecomagination highlighted the company's efforts to develop environmentally friendly "green" technologies such as solar energy, lower-emission engines, and water purification technologies. GE initially set several aggressive goals for the new initiative, including doubling the revenue from "Ecomagination" products to $20 billion in five years and promising to reduce greenhouse gas emissions by 1 percent within seven years. The company believed then and still believes that embracing innovation around Ecomagination is critical to its growth.

Immelt made some strategic restructuring decisions that helped the company survive the worldwide recession of 2008 and 2009 and also helped shift it even more in the B-to-B direction. GE moved from 11 divisions to five and sold off some of its consumer-focused businesses, including 51 percent of NBC Universal (sold to Comcast). This shift allowed the company to spend more resources on innovation, green initiatives, and its growing businesses such as power generation, aviation, medical imaging, and fuel cell technologies.

GE understood that it needed another huge initiative to help pull the conglomerate out of its current poor financial situation. Management believed there was huge growth potential in affordable health care around the world. As a result, the company embraced a $6 billion company-wide initiative called Healthymagination. The business strategy aimed at growing GE's health care business by providing innovative solutions to more people around the world, and the company launched an integrated marketing plan for it.

GE's B-to-B marketing savvy has helped it lock in the top position in the Financial Times's "World's Most Respected Companies" ranking for years. The company's in-depth understanding of each of its business markets has kept its B-to-B marketing strategies progressive, relevant, and effective. In addition, its global marketing campaign helps keep brand equity strong. GE was ranked sixth in Interbrand/BusinessWeek's "Top 100 Global Brands" report, with a brand value of $45 billion. "The GE brand is what connects us all and makes us so much better than the parts," Chief Marketing Officer Beth Comstock said.

Today, General Electric operates in a wide range of industries, including power and water, oil and gas, energy management, aviation, health care, transportation, home and business solutions, and capital. As a result, the firm sells a diverse array of products and services from home appliances to jet engines, security systems, wind turbines, and financial services. Its revenues topped $146 billion in 2013, making it so large that its largest business units could rank separately in the Fortune 200. If GE were a country, it would be the 50th largest in the world, ahead of Kuwait, New Zealand, and Iraq.

Questions

1. Discuss GE's B-to-B marketing strategy. Why has the company been so successful over the years at targeting such a large business audience?
2. Have "Ecomagination" and "Healthymagination" successfully communicated GE's focus on its newer endeavors? Why or why not?

8.8 Marketing Excellence >> BMW

BMW is the ultimate driving machine. Manufactured by the German company Bayerische Motoren Werke AG, BMW stands for both performance and luxury. The company was founded in 1916 as an aircraft-engine manufacturer and produced engines during World Wars I and II. It evolved into a

motorcycle and automobile maker by the mid-20th century, and today it is an internationally respected company and brand with $106 billion in sales in 2012.*

BMW's logo is one of the most distinctive and globally recognized symbols ever created. The signature BMW roundel looks like a spinning propeller blade set against a blue sky background—originally thought to be a tribute to the company's founding days as an aircraft-engine manufacturer. Recently, however, a New York Times reporter revealed that the logo, which features the letters BMW at the top of the outer ring and a blue-and-white checkered design in the inner ring, was trademarked in 1917 and meant to show the colors of the Free State of Bavaria, where the company is headquartered.

BMW's growth exploded in the 1980s and 1990s, when it successfully targeted the growing market of baby boomers and professional yuppies who put work first and wanted a car that spoke of their success. BMW gave them sporty sedans with exceptional performance and a brand that stood for prestige and achievement. The cars, which came in a 3, 5, or 7 Series, were basically the same design in three sizes. It was at this time that yuppies made Beemer and Bimmer the slang terms for BMW's cars and motorcycles, popular names still used today.

At the turn of the century, consumers' attitudes toward cars changed. Research showed that they cared less about the bragging rights of the BMW brand and instead desired a variety of design, size, price, and style choices. As a result, the company took several steps to grow its product line by targeting specific market segments. This resulted in unique premium-priced cars such as SUVs, convertibles, and roadsters, as well as less expensive compact cars like the 1 Series. In addition, BMW redesigned its 3, 5, and 7 Series cars, making them unique in appearance yet maintaining their exceptional performance. BMW's full range of cars now includes the 1 Series, 3 Series, 5 Series, 6 Series, 7 Series, X Series, Z4 Roadster, M Series, Hybrids, and BMWi.

BMW created the lower-priced 1 Series and X1 SUV to target the "modern mainstream," a group who are also family-focused and active but had previously avoided BMWs because of their premium cost. The 1 Series reached this group with its lower price point, sporty design, and luxury brand. The X1 and X3 also hit home with a smaller, less expensive SUV design.

The redesign of the 7 Series, BMW's most luxurious car, targeted a group called "upper conservatives." These wealthy, traditional consumers don't usually like sportier cars, so BMW added electronic components such as multiple options to control the windows, seats, airflow, and lights, a push-button ignition, and night vision, all controlled by a point-and-click system called iDrive. These enhancements added comfort and luxury, attracting drivers away from competitors like Jaguar and Mercedes.

BMW successfully launched the X Series by targeting "upper liberals" who had achieved success in the 1990s and gone on to have children and take up extracurricular activities such as biking, golf, and skiing. These consumers needed a bigger car for their active lifestyles and growing families, so BMW created a high-performance luxury SUV. BMW refers to its SUVs as sport activity vehicles in order to appeal even more to these active consumers.

BMW introduced convertibles and roadsters to target "post-moderns," a high-income group that continues to attract attention with more showy, flamboyant cars. BMW's 6 Series, a flashier version of the high-end 7 Series, also targeted this group.

BMW uses a wide range of advertising tactics to reach each of its target markets. However, the company's U.S. tagline, "The Ultimate Driving Machine," has remained consistent since it first launched there in 1974. During that time, sales have grown to more than 300,000 units in the United States in 2013. In recent years, BMW has returned to emphasizing performance over status, stating, "We only make one thing, the ultimate driving machine."

BMW owners are very loyal to the brand, and enthusiasts host an annual Bimmerfest each year to celebrate their cars. The company nurtures these loyal consumers and continues to research, innovate, and reach out to specific segment groups year after year.

Questions

1. How does BMW segment its consumers? Why does this work for BMW?
2. What does BMW do well to market to each segment group? Where could it improve its marketing strategy?
3. Should BMW ever change its tagline, "The Ultimate Driving Machine"? Why or why not?

8.9 Marketing Excellence >> Toyota

The world's largest automaker, Toyota has come a long way in its nearly 80-year history. The company launched its first passenger car, the Model AA, in 1936, copying the body design of Chrysler's landmark Airflow and the engine of a 1933 Chevrolet. Toyota then suffered several challenges, including a financial crisis in 1950. However, when consumers wanted smaller, more fuel-efficient automobiles during the 1973 oil crisis, the company responded. The Toyota Corona and Toyota Corolla offered basic features and acted as the company's new entry-level cars. Toyota also launched the Cressida, with the fuel efficiency consumers desired but space and amenities like air conditioning and AM-FM radio.

During the 1980s and 1990s, Toyota gradually added more models ranging in price, size, and features. In 1982, the company introduced the Camry—a four-door, mid-sized car that offered more space than the Corona and became the best-selling passenger car in North America. The first of the company's popular SUVs, the 4Runner, appeared in 1984 looking and acting much like a pickup truck. It later morphed into more of a passenger vehicle and led the way for the Rav4, Highlander, and LandCruiser. Toyota also introduced a full-sized pickup truck—today's Tundra—and several sporty and affordable cars that targeted young adults.

In 1989, it launched Lexus, its luxury division, promising an unparalleled experience starting with white-glove treatment at the dealership. Toyota understood, however, that each country defines luxury differently. In the United States, it meant comfort, size, and dependability; in Europe, attention to detail and brand heritage. As a result, the company varied its advertising depending on the country and culture.

In 1997, Toyota launched the Prius, the first mass produced hybrid car, for $19,995—between the Corolla and the Camry. The company's keen focus on developing a clean-energy car was brilliantly timed. Before the second-generation Prius hit showrooms in 2002, dealers had already received 10,000 orders. Over the next decade, Ford, Nissan, GM, and Honda followed the Prius with models of their own.

Toyota also started creating vehicles for specific target groups, like the Scion for young adults. Having learned this market wanted more personalization, the company now builds the car "mono-spec" at the factory, with just one well-equipped trim level, letting customers choose from dozens of customization elements at dealerships. Toyota marketed the Scion at music events and has showrooms where "young people feel comfortable hanging out and not a place where they just go stare at a car," said Scion Vice President Jim Letz.

Another big reason behind Toyota's success is its mastery of lean manufacturing and continuous improvement. Its plants can make as many as eight models at the same time, bringing huge increases in productivity and market responsiveness. The company also relentlessly innovates; a typical Toyota assembly line makes thousands of operational changes in a year. Employees see their purpose as threefold: making cars, making cars better, and teaching everyone how to make cars better. The company encourages problem solving, always looking to improve the process by which it improves all other processes.

Toyota has integrated its assembly plants around the world into a single giant network that can customize cars for local markets and shift production quickly to meet surges in demand from markets worldwide. The company is thus able to fill market niches inexpensively as they emerge, without building whole new assembly operations. "If there's a market or market segment where they aren't present, they go there," said Tatsuo Yoshida, auto analyst at Deutsche Securities Ltd.

Over the years, Toyota automobiles have consistently ranked high in quality and reliability. In 2009 and 2010, however, the company recalled more than 8 million cars for potential perceived problems ranging from sticking accelerator pedals to sudden acceleration to software glitches in the braking system. The Lexus, Prius, Camry, Corolla, and Tundra brands were all affected. Next, Toyota lost billions of dollars when an earthquake and tsunami in Japan destroyed the company's plants and parts suppliers in 2011. TMC President Akio Toyoda said, "We have faced many challenges since 2009, but have learned valuable lessons including the need for Toyota to maintain sustainable growth."

Despite these challenges, Toyota recouped its losses. Its strong focus on hybrid vehicles has proved profitable and helped the company rebound. It sold its 4 millionth unit in 2012 and plans to continue to innovate hybrids, believing "there are many more gains we can achieve with hybrids." Today, Toyota offers a full line of cars for the global market, from family sedans and sport utility vehicles to trucks and minivans. In 2013, the company earned more than 22 trillion yen (or $217 billion) and sold 8.87 million automobiles, edging past General Motors to become the world's largest carmaker.

Questions

1. Toyota has built a huge manufacturing capacity that can produce millions of cars each year for a wide variety of consumers. Why was it able to become so much bigger than any other auto manufacturer?
2. Has Toyota done the right thing by manufacturing a car brand for everyone? Why or why not?

8.10 Marketing Excellence >> Parkway Group Hotels

Parkway Group Healthcare, headquartered in Singapore, was founded by Dr. Lim Cheok Peng and others in 1987 and has grown internationally by annexing other hospitals. For example, Parkway's joint venture with Apollo Hospitals in India has facilitated its expansion into that market. Parkway's hospitals provide exceptional patient care and offer specialty clinics in areas, including oncology, neurology, optometry, and fertility. Its radiology department serves hospitals regionally, its laboratories serve inpatients and outpatients in Singapore, and it runs a physical rehabilitation service. In 2013, the Medical Travel and Health Tourism Quality Alliance (MTQVA) ranked Singapore's Gleneagles Hospital, Parkway's flagship facility, as ninth highest on its list for medical tourism in 2013. According to the MTQVA, Gleneagles provides top-quality medical services in a top-quality location. This high acclaim is testament to Parkway Group's primary mission, which is to make a difference in people's lives through a high level of patient care.

Parkway's focus on providing excellent service starts with its pre-admission procedure and continues through post-surgical care. To take patients' needs fully into account, the company applies a different set of service standards in different hospitals. In all its hospitals, however, patients can just approach the reception counter and ask for assistance instead of making appointments beforehand. Doctors on duty make the preliminary recommendations, then hospital administrators bring in appropriate specialists to provide the necessary care.

Parkway operates 18 hospitals with over 3,500 beds in Singapore, Malaysia, Brunei, India, China, and the United Arab Emirates. Patients are treated like five-star hotel guests. At Danat Al Emarat Women & Children's Hospital in Abu Dhabi, patient rooms are fully equipped with high-speed Internet, video-on-demand, and video games for children. The Royal Suites at Danat Al Emarat have dedicated medical staff exclusive to each suite. But Parkway attends to more than just a patient's comforts. At Singapore's flagship Gleneagles Hospital, post-surgical care insurance provides coverage for treatment of postsurgical complications for all patients. Coverage begins from the moment initial surgery is completed and ends 24 hours after a patient has been discharged.

Parkway's Pantai Hospital in Penang, Malaysia, caters to patients at all socioeconomic levels. At the lowest price range, beds in the open ward, painted a cool lavender, begin at $40. However, a Deluxe Room costing $110 per night has the feel of a luxury chalet. It is fully airconditioned and features a lounge area with a dining table and private bathroom. A refrigerator is provided as well: patients in Pantai Penang's Deluxe suites are meant to feel as much at home as possible.

Gleneagles Singapore has a novel way of attracting new patients. The hospital invites specialists to purchase or rent rooms on its premises. Then, because of proximity, these doctors tend to admit their patients to Gleneagles, the admissions desk operates around the clock to accommodate every patient that walks in through the door. A patient is allowed to proceed to the admissions desk at any time of day, without the need for a referral, and be guaranteed a bed. Gleneagles has 700 doctors and, across the whole of Singapore, the group has around 4228 doctors.

Parkway understands that patients have the right to be treated with dignity, respect, and be kept fully apprised of the progress of their treatment, via a translator if needed. A patient in a Parkway hospital is also always entitled to request a second opinion from an accredited doctor; the company believes every patient must be allowed to participate in, and understand, their own health care needs. Parkway Patient Assistance (PPA), one of the Gleneagles Singapore's initiatives, provides a one-stop service for international patients looking for specialist expertise, personalized care, and cutting-edge technology. PPA staff also provides advice on estimated costs of treatments and procedures.

The CEO of Parkway Holdings, Dr. Tan See Leng, has noted that Asia is becoming a hub for patient treatment. He believes that the next 1–2 years will see great benefits for Asian health care providers, as long as high-quality service is provided. Parkway Group's biggest strength lies in its ability to capture the market for medical tourists in the Asian region, expected to be worth at least $10 billion by 2015. Low-cost, high-quality health care in Asia is estimated to attract over 10 million tourists a year. If Parkway Group continues to expand its reach and maintain the world-class quality of its medical establishments, then the sky is the limit for what it can achieve.

Questions

1. With many hospitals in Asia competing in the medical tourism market, how can Parkway position itself in order to attract more patients?
2. Parkway hospitals do not employ many doctors but depend on the use of the hospital services by private specialists. What 33are the risks in this approach?

8.11 Marketing Excellence >> Red Bull

Red Bull's integrated marketing communications mix has been so successful that the company has created an entirely new billion-dollar drink category—energy drinks. In addition, Red Bull has become a multibillion-dollar beverage brand among fierce competition from beverage kings like Coca-Cola, Pepsi, and Anheuser-Busch. To date, the company has sold more than 40 billion cans of energy drinks across 166 countries. How? Red Bull became the energy drink market leader by skillfully connecting with youth around the globe and doing it differently than anyone else.

Dietrich Mateschitz founded Red Bull with a single product in Austria in 1987. By 1997, the slender silver- and-blue can was available in 25 markets globally, including Western and Eastern Europe, New Zealand, and South Africa. Its size and style immediately signaled to consumers that its contents were different from traditional soft drinks. Red Bull's ingredients—amino acid taurine, B-complex vitamins, caffeine, and carbohydrates— were specifically formulated to make the drink highly caffeinated and energizing. In fact, some users have referred to it as "liquid cocaine" or "speed in a can." Over the past decade, the company introduced other products and flavors, many of which did not succeed. Today, Red Bull offers the original Red Bull Energy Drink, Red Bull Total Zero, Red Bull Sugar Free, and special editions infused with berry, lime, and cranberry flavors.

As the company continued to expand worldwide, it developed an integrated marketing communications plan that reached its target audience on many different levels and built its brand image of authenticity, originality, and community. First, Red Bull focused on pre-marketing, sponsoring events like the Red Bull Snowthrill of Chamonix ski contest in France to help build word-of-mouth excitement around the brand. Once the company entered a new market, it built buzz through its "seeding program," micro-targeting trendy shops, clubs, bars, and stores. This enabled the cultural elite to access Red Bull's product first and influence other consumers. As one Red Bull executive explained, "We go to on-premise accounts first, because The product gets a lot of visibility and attention. It goes faster to deal with individual accounts, not big chains and their authorization process." The company also targeted opinion leaders likely to influence consumers' purchases, including action sports athletes and entertainment celebrities.

Once Red Bull gained some momentum in bars, it moved into gyms, health food stores, restaurants, convenience stores near colleges, and eventually supermarkets. The company's primary point-of-purchase tool has always been its refrigerated sales units, prominently displaying the Red Bull logo. These set the brand apart from other beverages and ensure a prominent location in every retail environment. To guarantee consistency and quality in its point-of-purchase displays, the company hired teams of delivery van drivers whose sole responsibility was stocking Red Bull.

Another essential aspect of Red Bull's marketing communication mix is product trial. Whereas traditional beverage marketers attempt to reach the maximum number of consumers with sampling, the company seeks to reach consumers only in ideal usage occasions, namely when they feel fatigue and need a boost of energy. As a result, its sampling campaigns take place at concerts, parties, festivals, sporting events, beaches, highway rest areas (for tired drivers), and college libraries and in limos before award shows.

Red Bull also aligns itself with a wide variety of extreme sports, athletes, and teams and artists in music, dance, and film. From motor sports to mountain biking, snowboarding to surfing, rock concerts to extreme sailing, there is no limit to the craziness of a Red Bull event or sponsorship. A few company-sponsored events are notorious for taking originality and extreme sporting to the limit. For example, at the annual Flugtag, contestants build homemade flying machines that must weigh less than 450 pounds, including the pilot. Teams launch their contraptions off a specially designed Red Bull–branded ramp, 30 feet above a body of water. Crowds of as many as 300,000 young consumers cheer as the contestants and their craft try to stay true to the brand's slogan: "Red Bull gives you wings!"

Red Bull uses traditional advertising once the market has grown mature and the company needs to reinforce the brand to its consumers. As one executive explained, "Media is not a tool that we use to establish the market. It is a critical part. It's just later in the development."

Red Bull's "anti-marketing" marketing communications strategy has been extremely successful connecting with its young consumers. It falls directly in line with the company's mission to be seen as unique, original, and rebellious—just as its Generation Y consumers want to be viewed.

Questions

1. What are Red Bull's greatest strengths as more companies (like Coca-Cola, Pepsi, and Monster) enter the energy drink category and gain market share? What are the risks of competing against such powerhouses?
2. Discuss the pros and cons of Red Bull's nontraditional marketing tactics. Should the company do more traditional advertising? Why or why not?
3. Discuss the effectiveness of Red Bull's sponsorships. Where should the company draw the line in terms of novelty and risk?

9. Books:

Reference Books:

1. Philip Koteler, Kevin Lane Keller **"**Marketing Management" 15 edition, Pearson India Education Services Pvt.Ltd. ISBN 978-93-325-5718-5.
2. Philip Koteler, Kevin lane Keller, Abraham Koshy and Mithileshwar Jha "Marketing Management A South Asian Perspective". 13 Edition, 2012, Pearson Prentice – Hall of India private limited, ISBN-978-81-317-1683-0
3. Philip Koteler "Principles of Marketing", Prentice - Hall.
4. Michael R Czinkota, Marketing Management, 2nd Edition. Vikas Publishing House, ISBN 981-240-366-3
5. Wiliam J Stannon, "Fundamentals of Marketing", McGraw HIll
6. R.SS. Pillia and Mrs. Bagavathi "Marketing" S. Chand & Co. Ltd
7. S.A Sherlaker, "Marketing Management", 13 Edition.
8. Rajagopal, Marketing Management Text & Cases, Vikas Publishing House.

MOOC Course: https://www.edx.org/course/marketing-management-iimbx-mk102x#!

NPTEL Course: http://nptel.ac.in/courses/110104068/3

10. Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	**20**	**20**
CIE-II	**20**	**20**
Assignments/Quizzes/ Case Study/Course Project/ Term Paper/Field Work etc.	**10**	**10**
SEE	**100**	**50**
Total	**150**	**100**

10.1 Details of Assignment: (Not Limited to)

Assn.	Questions/Case Study/Quiz	Marks	CO	BLL	PI	CA	PO
1	Write answers to review questions for each unit	2	ALL	--	--	--	--
2	Conduct market research for the opportunity/ problem you have chosen.	2	CO1	L6	--	--	--
3	Carry out the product brand relationship strategies for the chosen company	2	CO3	L5	--	--	--
4	Quiz of marketing	2	ALL	ALL	--	--	--
5	Choose any 5-advertising program you have seen and present a review on the same	2	CO5	L4	--	--	--

10.2 SEE Model Question Paper

USN	2	B	A							

MODEL QUESTION PAPAER

UIP012E: MARKETING MANAGEMENT

PART A is Compulsory and answer any 4 questions from PART B selecting at least ONE from each UNIT.

Question Number		Question	Marks	BLL	CO	PI
		PART A				
	a)	Define the term marketing.	2	2	CO1	2.1.1
	b)	Name any four components of the macroenvironment	2	2	CO1	4.1.1
	c)	Draw a neat block diagram for Maslow's hierarchy of needs theory	2	1	CO2	9.1.1
	d)	Draw a neat diagram for five product levels	2	1	CO3	6.1.1
	e)	Name the steps involved in setting a pricing policy	2	2	CO5	4.1.1
	f)	What is organizational buying?	2	2	CO2	3.1.1
	g)	Name major types of store retailers	2	2	CO4	3.1.1
	h)	Define pricing	2	2	CO5	3.1.1
	i)	Define packaging	2	2	CO3	3.2.1
	j)	Draw a simple marketing system	2	2	CO1	2.1.1
		PART B				
		UNIT-I				
1	a)	What is marketed? Explain any two of them.	10	2	CO1	2.1.1
	b)	Define marketing information system. Enumerate the importance of information in modern marketing.	10	2	CO1	3.1.1
2	a)	Explain various company orientations towards the marketplace.	10	2	CO1	2.1.1
	b)	Mr. Vedant is a product manager, in the cosmetics division, at Proctor and Gamble, Mumbai. He is interested in introducing a men's face wash as he feels, there is ample a market for men's face washes. He wants to carry out market research on face washes to	10	2	CO1	3.2.1

Question Number		Question	Marks	BLL	CO	PI
		understand the market potential of the product he wants to introduce. Design a questionnaire for Mr. Vedant to support in carrying out the market research. (At least five different types of questions in each of open ended and close ended should be used in the questionnaire)				
		UNIT – II				
3	**a)**	**In the changed scenario of teaching-learning process, post COVID19 era, you father is interested in buying a laptop to support your learning process. Design a five-stage buying decision process model to help your father to get the best laptop foy you.**	**10**	**3**	**CO2**	**3.2.1**
	b)	**Draw a neat block diagram for key psychological processes (Stimulus-response model). Explain perception as an important consumer psychological process.**	**10**	**3**	**CO2**	**3.1.1**
4	**a)**	**What are the steps in the segmentation process?**	**10**	**2**	**CO2**	**4.1.2**
	b)	**Classify any Ten of the following buying situations according to their buying situations:** **1. Custom-made CNC machine** **2. New Production center at Bagalkot** **3. Replacement of computers** **4. Papers for office use** **5. Vehicles for company managers** **6. Bulk chemicals** **7. Common Nuts and bolts** **8. Hiring a consultant to help company employees** **9. Weapons for the Defence Ministry** **10. Soaps and detergents for company use** **11. A transformer which is burnt in the company** **12. Modern furniture for CEO chamber**	**05**	**3**	**CO2**	**3.1.1**
	c)	**Differentiate between business markets and consumer markets (Any 5).**	**05**	**3**	**CO2**	**5.1.1**
		UNIT – III				
5	**a)**	**What are the distinctive characteristics of services? Explain them.**	**10**	**2**	**CO3**	**6.1.1**
	b)	**Define retailing. Name and briefly explain major types of store retailers.**	**10**	**2**	**CO4**	**3.1.1**
6	**a)**	**Draw a neat diagram for the product mix and product line length of a chosen company.**	**10**	**3**	**CO3**	**3.1.1**
	b)	**Name and explain product differentiation strategies.**	**10**	**2**	**CO3**	**3.1.5**
		UNIT – IV				
7	**a)**	**What are the steps involved in setting a pricing policy?**	**05**	**1**	**CO5**	**4.1.1**
	b)	**Define the following** **i) Mark-up pricing** **ii) Value pricing**	**05**	**1**	**CO5**	**4.1.1**

Question Number		Question	Marks	BLL	CO	PI
		iii) Target return pricing iv) Going rate pricing v) Perceived-value pricing				
	c)	Discuss with a neat sketch five M's of advertising	10	2	CO5	10.1.1
8	a)	Name and explain the factors affecting advertising budget.	10	2	CO5	10.1.1
	b)	Write a note on major media types	10	2	CO5	10.1.2
		BLL: Bloom's Learning Level				
		CO: Course Outcome				
		PI: Performance Indicator				

Dr. C.M.Javalagi
Faculty- Incharge

Dr.C.M.Javalagi
Head of the Deprtment

BASAVESHWAR ENGINEERING COLLEGE, BAGALKOTE

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING

COURSE PLAN

Title of the Course	**:**	**Operations Management**	**Course Code**	**:**	**UIP750C**
Credits	**:**	**04**	**Contact Hours/ Week**	**:**	**5(3-2-0)**
Total Hours	**:**	**40 hours of Teaching and 28 hours of Tutorial**	**Tutorial Hours**	**:**	**28**
CIE Marks	**:**	**50**	**SEE Marks**	**:**	**50**
Semester	**:**	**VII**	**Year**	**:**	**2023-24**
Name and Signature of the Faculty	**:**	**Dr.C.M.Javalagi**	**Name and Signature of Head of the Department**	**:**	**Dr.C.M.Javalagi**

1. Prerequisites: Management and Entrepreneurship

2. Course Objectives:

The Course objectives are:	
2.1	To describe how the operations have strategic, tactical and operational importance and how they can provide a competitive advantage and to consider System design and capacity decisions
2.2	To classify inventory management system
2.3	To appreciate techniques of location and facility planning; line balancing; and capacity planning in operations management
2.4	To consider the methods of forecasting and aggregate planning with various methods of the techniques
2.5	To understand the concepts and underlaying parameters of Material Requirements planning (MRP)
2.6	To analyse the Single Machine Scheduling, Flow Shop Scheduling and job shop scheduling

3. Course Outcomes:

At the end of the course the student should be able to:	
3.1	Illustrate how operations management is important for an organization and analyse the facility location decisions and the inventory systems
3.2	Evaluate forecasting methods and apply them to real life problems
3.3	Analyse aggregate planning and MPS, also compare different aggregate planning methods.
3.4	Illustrate the importance of materials requirements planning and controlling. Analyse design of service systems
3.5	Analyse the flow shop and job shop scheduling

4. Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Programme Outcomes / Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
The students will be able to:																
3.1	Illustrate how operations management is important for an organization and analyse the facility location decisions, and the inventory systems		**2**	**2**	**2**							**2**		**2**	**3**	
3.2	Evaluate forecasting methods and apply them to real life situations and problems		**2**	**3**	**3**	**2**						**2**		**2**	**3**	
3.3	Analyse aggregate planning and MPS, also compare different aggregate planning methods.		**2**	**3**	**3**	**2**						**2**		**2**	**2**	
3.4	Illustrate the importance of materials requirements planning and controlling and Analyse design of service systems		**2**	**3**	**3**	**2**						**2**		**3**	**3**	
3.5	Analyse the flow shop and job shop scheduling		**2**	**3**	**3**	**2**						**1**		**2**	**2**	

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

5. Competencies Addressed in the course and Corresponding Performance Indicators

5.1 Programme Outcome: Any of 1 to 12 PO's:

PO	Competency (CA)	Performance Indicators (PI)
PO2	**2.1: Demonstrate an ability to identify and formulate complex engineering problem**	**2.1.1:** Articulate problem statements and identify objectives **2.1.2:** Identify engineering systems, variables, and parameters to solve the problems
	2.2: Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	**2.2.2:** Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions **2.2.3:** Compare and contrast alternative solution processes to select the best process.
	2.3: Demonstrate an ability to formulate and interpret a model	**2.3.1:** Combine scientific principles and engineering concepts to formulate model/s (mathematical or otherwise) of a system or process that is appropriate in terms of applicability and required accuracy. **2.3.2:** Identify assumptions (mathematical and physical) necessary to allow modeling of a system at the level of accuracy required.
	2.4: Demonstrate an ability to execute a solution process and analyze results	**2.4.1:** Apply engineering mathematics and computations to solve mathematical models Produce and validate results through skillful use of contemporary engineering tools and models **2.4.3:** Extract desired understanding and conclusions consistent with objectives and limitations of the analysis
PO3	**3.1: Demonstrate an ability to define a complex/ open-ended problem in engineering terms**	**3.1.1:** Recognize that need analysis is key to good problem definition **3.1.4:** Explore and synthesize engineering requirements considering health, safety risks, environmental, cultural and societal issues **3.1.5:** Determine design objectives, functional requirements and arrive at specifications
	3.2: Demonstrate an ability to generate a diverse set of alternative design solutions	**3.2.1:** Apply formal idea generation tools to develop multiple engineering design solutions **3.2.2:** Build models/prototypes to develop a diverse set of design solutions **3.2.3:** Identify suitable criteria for the evaluation of alternate design solutions
	3.3: Demonstrate an ability to select an optimal design scheme for further development	**3.3.1:** Apply formal decision-making tools to select optimal engineering design solutions for further development
PO4	**4.1: Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding**	**4.1.1:** Define a problem, its scope and importance for purposes of investigation **4.1.3:** Apply appropriate instrumentation and/or software tools to make measurements of physical quantities **4.1.4:** Establish a relationship between measured data and underlying physical principles.
	4.3 Demonstrate an ability to analyze data and reach a valid conclusion	**4.3.1:** Use appropriate procedures, tools, and techniques to conduct experiments and collect data **4.3.2**: Analyze data for trends and correlations, stating possible errors and limitations **4.3.3:** Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions **4.3.4:** Synthesize information and knowledge about the

PO	Competency (CA)	Performance Indicators (PI)
		problem from the raw data to reach appropriate conclusions
PO5	**5.1 Demonstrate an ability to identify/ create modern engineering tools, techniques and resources**	**5.1.1:** Identify modern engineering tools such as computer-aided drafting, modeling and analysis; techniques and resources for engineering activities **5.1.3:** Create/adapt/modify/extend tools and techniques to solve industrial engineering problems
	5.3 Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	**5.3.1:** Discuss limitations and validate tools, techniques and resources **5.3.2:** Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
PO11	**11.1 Demonstrate an ability to evaluate the economic and financial performance of an engineering activity**	**11.1.1**:Describe various economic and financial costs/benefits of an engineering activity **11.1.2:** Analyze different forms of financial statements to evaluate the financial status of an engineering project **11.1.3:** Identify business opportunities, carryout feasibility study and prepare project proposals
	11.2 Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity	**11.2.1**: Analyze and select the most appropriate proposal based on economic and financial considerations

6. Course Content:

Hours Required	Topic to be covered	Mode of Delivery
	UNIT-I	
01	**Operations Management Concepts:** Introduction, historical developments, Functions of operations management	Chalk and talk in classroom/Lecture combined with discussions/ PPT/ Case Studies
01	Environment of operations. Operations system decisions.	
01	**System Design and Capacity Planning:** Introduction, manufacturing and service systems,	
01	Design and system capacity, Capacity planning	
01	**Facility Location and Layout:** Location planning for goods and services. Economic analysis (Location break-even analysis, cost minimization),	
01	Qualitative factor analysis, Facility layout, analysis, Selection of layout (minimizing cost in job shop layout, line balancing in assembly line layout).	
01	Determination of layout, types of layouts, computer application of layouts.	
01	**Inventory Management:** Definition, Inventory planning for independent demand items,	
01	Types of inventories, Inventory costs, Inventory control for deterministic demand items,	
01	Inventory control systems, Selective control of inventory, other issues in inventory planning and control.	
	(10 hours of Teaching +7 hours of Tutorial)	
	UNIT-II	**Mode of Delivery**
01	**Forecasting:** Forecasting objectives and uses, forecasting variables	Chalk and talk in classroom/Lecture combined with discussions/ PPT/ Case Studies
01	Forecasting methodology, Opinion, and Judgemental methods	
01	Time series methods	
01	Exponential smoothing	
01	Regression and correlation methods	
01	**Aggregate Planning: Introduction:** Objective of aggregate planning, Aggregate planning methods - policy guidelines	
01	Graphic and charting methods	
01	Transportation method of solving APP	
01	Transportation method of solving APP…. Cont.	
01	Master scheduling objective, master scheduling methods	
	(10 hours Teaching +7 hours Tutorial)	
	UNIT-III	
01	**Material Requirements Planning:** Underlying concepts	Chalk and talk in classroom/Lecture combined with discussions/ PPT/ Case Studies
01	System parameters	
01	MRP Logic	
01	MRP Logic *Cont*..	
01	MRP implementation	
01	**Design of service systems:** Characteristic aspects, Customer Contact in Service Systems,	
01	Complexity and Divergence in Service Systems,	
01	Service Positioning, Service Blueprinting,	
01	Other Aspects of Addressing Capacity Issues in Services,	
01	Service Quality	
	(10 hours Teaching +7 hours Tutorial)	
	UNIT-IV	**Mode of Delivery**
01	**Scheduling and Controlling:** Introduction, objectives of scheduling,	Chalk and talk in classroom/Lecture
01	Scheduling strategies, scheduling and loading guidelines.	

Hours Required	Topic to be covered	Mode of Delivery
01	Brief discussion on scheduling, methodology - Gantt charts, schedule boards and priority decision rules.	combined with discussions/ PPT/ Case Studies
01	Priority and Capacity control.	
01	**Single Machine Scheduling:** Concept, measures of performance,	
01	SPT rules. Weighted mean flow time	
01	EDD rules, minimizing total tardiness	
01	**Flow Shop Scheduling:** Introduction, Johnson's problem,	
01	CDS heuristic, Palmer's heuristic	
01	**Job shop scheduling:** Types of schedules, heuristic procedure, 2 jobs M machine scheduling	
	(10 hours Teaching +7 hours Tutorial)	

7. Review Questions:

No	Review Questions	CO	BLL	PI addressed
	UNIT-I			
1.	Define operations management. Trace briefly the historical events leading to the study of operations management.	**1**	**L2**	**2.1.1**
2.	What are the key terms involved in operations management?	**1**	**L2**	**2.1.1**
3.	Explain with a neat sketch operations system decision.	**1**	**L2**	**2.1.2**
4.	Differentiate between manufacturing and service systems with examples	**1**	**L3**	**2.1.2**
5.	With the help of a neat sketch, show the relationship between design and system capacity. Describe them briefly.	**1**	**L3**	**2.1.2**
6.	Explain factors influencing plant location	**1**	**L2**	**11.1.1**
7.	Explain various steps involved in locational break-even analysis with an example	**1**	**L3**	**3.1.1**
8.	Mr. X is interested in setting up a food processing plant. He has carried out the quantitative factor analysis and finalized three locations A, B, and C. However, he is interested in using qualitative factor analysis for the final decision. Help Mr. X by developing qualitative factor analysis to decide for the food processing plant.	**1**	**L4**	**2.4.1**
9.	Briefly explain different types of plant layout	**1**	**L2**	**2.1.1**
10.	You are given an assignment of developing an economic evaluation of four potential plant sites. The analysis is to be applicable to a relatively wide range of volumes. It is to be presented to the board of directors in summary form for their consideration. Describe how you would develop and present the data.	**1**	**L4**	**3.2.1**
11.	How does the systematic layout planning approach differ from the basic load-distance analysis?	**1**	**L3**	**3.2.1**
12.	Do organizations need to carry inventory? Why?	**1**	**L2**	**4.1.3**
13.	On what basis would you recommend the periodic review system of inventory control?	**1**	**L2**	**4.1.3**
14.	Derive an expression for Economic Order Quantity (EOQ)?	**1**	**L3**	**4.1.3**
15.	When it is appropriate to use the ABC classification scheme and the FSN classification scheme?	**1**	**L3**	**4.3.1**
16.	Numerical questions on above topics	1	**L3,L4**	--
	UNIT-II			
1	What is forecasting? List the steps involved in forecasting	**2**	**L1**	**2.1.1**
2	Briefly explain the objectives of forecasting	**2**	**L2**	**2.1.1**
3	What are forecasting variables? Explain anyone in detail.	**2**	**L2**	**2.1.2**
4	Name and explain demand patterns in forecasting	**2**	**L3**	**2.1.2**

No	Review Questions	CO	BLL	PI addressed
5	Write short notes on i) Least squares method of forecasting ii) Exponential smoothing method of forecasting iii) Moving average method	**2**	**L2**	**2.1.2**
6	What is time series? What are the components of time series?	**2**	**L2**	**2.1.2**
7	List various techniques of forecasting under opinion and judgement method. Explain any two	**2**	**L3**	**2.1.3**
8	Write a brief note on seasonal indexes and they can be applied to situations.	**2**	**L3**	**2.1.3**
9	What is aggregate planning? Explain decision variables and associated costs in aggregate planning	**3**	**L2**	**2.1.2**
10	Explain the objectives of aggregate planning.	**3**	**L3**	**2.1.1**
11	Write a note on aggregate planning guidelines	**3**	**L2**	**2.1.1**
12	What are different methods for solving aggregate planning problems? Explain anyone.	**3**	**L2**	**3.2.1**
13	Name master scheduling policy guidelines	**3**	**L2**	**2.2.1**
14	What is Master Production Schedule? Explain the functions of MPS in detail.	**3**	**L2**	**2.1.3**
15	Differentiate between aggregate planning and master scheduling	**3**	**L2**	**2.2.3**
16	Numerical questions on above topics	**3 & 4**	**L3,L4**	
	UNIT-III			
1	Define materials requirement planning. Explain the fundamental concepts of MRP.	**4**	**L2**	**2.1.1**
2	State limitations of MRP.	**4**	**L2**	**2.3.1**
3	Explain the important system parameters of MRP system.	**4**	**L2**	**2.4.1**
4	What are the major outputs from a MRP system? Explain with help of a neat sketch.	**4**	**L3**	**2.4.2**
5	Define the following terms i) Lot Size ii) Bill of materials iii) Parent and component items iv) Dependent demand v) Scheduled receipt vi) Planned receipt	**4**	**L1**	**2.1.1**
6	Write a note on MRP implementation.	**4**	**L2**	**2.1.1**
7	Is process design in service systems any different from that in manufacturing systems?	**4**	**L3**	**2.2.3**
8	What do we mean by service positioning? What are the factors that determine service positioning?	**4**	**L2**	**2.1.1**
9	What do we mean by customer contact in service organizations? How does it affect the design of service systems?	**4**	**L4**	**4.1.1**
10	What factors significantly determine the design of service systems?	**4**	**L2**	**3.1.1**
11	How do address capacity issues in services?	**4**	**L2**	**2.4.1**
12	How is service quality measured?	**4**	**L3**	**2.2.2**
13	Numerical questions on above topics	**4**	**L3,L4**	
	UNIT-IV			
1	What is scheduling? Enumerate its objectives.	**5**	**L2**	**2.1.1**
2	Compare different scheduling strategies	**5**	**L4**	**2.1.2**
3	Identify some characteristics necessary to have a production activity control system run effectively	**5**	**L2**	**2.1.2**
4	What are the major restrictions in applying Johnson's rule?	**5**	**L2**	**2.1.3**
5	What are the objectives of production activity control?	**5**	**L2**	**2.2.2**
6	Explain the following scheduling methodology i) Gantt Charts, Schedule boards and computer graphics ii) Priority Decision rules	**5**	**L2**	**2.4.1**
7	Discuss SPT and EDD priority rules for sequencing the jobs.	**5**	**L2**	**4.1.2**
8	Explain flow-shop scheduling and job-shop scheduling.	**5**	**L2**	**2.1.1**
9	What is CDS heuristics? Explain its stages.	**5**	**L2**	**2.2.2**

No	Review Questions	CO	BLL	PI addressed
10	Discuss the Johnson's rule for solving flow shop scheduling problems with example.	**5**	**L3**	**2.4.1**
11	What are the assumptions in flow shop scheduling?	**5**	**L2**	**2.1.1**
12	Distinguish between single-machine scheduling and flow shop scheduling	**5**	**L3**	**2.1.2**
13	Numerical questions on above topics	**5**	**L3, L4**	

8.

8.1 Representative Case-Study 1:

Inventory Management in a Consumer Products Company

A consumer products company dealing in cosmetics and other personal-care products was exploring ways to reduce inventory levels across their outbound supply chain and improve inventory record accuracy at their storage points. The company had a supply chain network of three factories with bonded stock rooms (BSRs) attached for dispatch to the depots and 35 depots for servicing distributors. Goods moved from the factory to the BSRs. The BSRs dispatched stocks to one centralized depot. Other depots received stocks from this depot and sold them to distributors. These depots were holding high levels of inventory of old/withdrawn stocks and damaged stocks for a long time (over three months). The total average

inventory holding at the BSRs was 8.2 weeks of sales and at the depots was 6.5 weeks of sales. There were several reasons for high levels of inventory. Some of them are discussed here. Sales and dispatch forecasts were not in line with actual sales. Furthermore, there was no process to periodically review and refine the annual forecasts utilizing market feedback. Stocking across all points in the distribution chain was driven by a push-oriented system that did not have any provision for factoring in market requirements. Actual safety stocks maintained at depots were significantly higher than the target safety stocks agreed on at the beginning of the operating year. No system was in place to monitor and correct this practice. There was also a high level of old/damaged/slow-moving stocks. Dead stock was allowed to accumulate in the system mainly because there was an absence of visibility into inventory details across stocking points. The process to monitor and act on dead stock was not adhered to and records of slow-moving/old/damaged stocks were not maintained methodically at the stocking points. A study was conducted focusing on the inventory- related issues at the BSRs and depots. This included inventory holding as a proportion of sales, practices employed for tracking goods in the warehouse, and the proportion of fast- and slow-moving stocks to the total inventory. The study also looked at the inventory planning process pertaining to forecast accuracy, the process of reviewing and revising forecasts, the level of safety stock at each location, combined with the process to review and reset the same An IT solution was implemented for computing the forecast using consolidated orders, with factoring for promotions and seasonality. The IT solution also enabled the organization to calculate safety stock levels based on the number of weeks of sales target. Demand planning and forecasting were made a periodic activity using the IT solution to align forecasting with market orders and actual sales. The process of setting safety stocks at depots was made periodic and dynamic, based on updated sales data. Furthermore, norms were set to act on damaged/old and other dead stocks. Clear steps were laid down regarding the liquidation or destruction of these stocks. An accountability chain was set up in the organization to monitor and authorize activities in this regard, based on the visibility provided by the IT solution. The overall benefit of the exercise was that the organization was able to ensure availability of fresh stocks in the market. This was achieved mainly by reducing inventory levels across the chain and also through better stock management at the depots. The company achieved a stock-level reduction from 8.2 weeks to 5.5 weeks at the BSRs and from 6.5 weeks to 4 weeks at the depots. Transparency of saleable and damaged stocks quantities across the supply chain resulted in more accurate demand planning, stock allocation, and production.

Source: K. Ravichandran and Debjyoti Paul, "Best Practices in Inventory Management," http://forumcentral.sify.com/athena/ login/casestudyinventory.pdf. Last accessed on 15 December 2008.

8.2 Representative Case-Study 2:

The Role of Forecasting in a Petrochemical-manufacturing Company

Forecasting has always been an important activity in manufacturing and service organizations. For a manufacturer of petrochemicals, its role is crucial as long-term contracts for feedstock (the prime raw material in the petrochemical industry) could provide the competitive advantage of costeffective inputs. With the wild fluctuations in the price of crude in recent times, the value of forecasting is even greater. Consider the polyethylene plant of Reliance Industries Limited (India's largest petrochemical manufacturer) at Hazira, near Surat. Forecasting the requirement of polyethylene is no simple task. There are several complexities in the process. For example, exchange rate fluctuations and geopolitical movements (such as the Kuwait, Afghan, and Iraq wars) could significantly affect the demand–supply of feedstock. On the domestic front, the installed capacity and capacity projections of all the players in the sector and excise and customs tariff schedules could affect the demand–supply scenario for its final product. Let us understand the various steps involved in the forecasting process and the nature of decisions taken. The process starts with certain assumptions about the tariff structure for customs and excise, the prevailing local price, exchange rate fluctuations, import price, and the nature of competition. Based on these assumptions, the total market for polyethylene in the medium term of 18 to 36 months is arrived at. In the next step, an analysis of the supply–demand position is made on the basis of its own capacity and competitors' capacity and expansion plans during the year. Based on these, the demand to be met during the next planning year is arrived at. This is based on a series of forecasting exercises done at various levels and actual collection and analysis of the end-use data of the previous year. At this stage, a certain level of aggregation of data is required. For example, there will be several grades of polyethylene in production and several new grades will be introduced during the planning year. This data needs to be aggregated in order to analyse capacity requirements and match them with capacity availability. Similarly, the end-use data is collected at the tertiary level and progressively aggregated at regional and national levels. This data is used in the forecasting exercises carried out to estimate future demand. The output from forecasting is put to several important uses. The foremost use is balancing capacity availability to actual projected requirement for the planning year. This is done by some decisions on de-bottlenecking schedules, adjusting planned maintenance schedules and reworking some technology upgradation initiatives. Furthermore, the forecasting exercise directly leads to detailed production planning for the year. During this stage, the data is disaggregated into specific product variants and scheduling plans for each variant arrived at. At this stage, changeover considerations from one product variant to another are taken into consideration. The forecasting exercise also helps in establishing performance targets for the year for various departments such as production, materials, and marketing, as well as in the setting up of control systems.

8.3 Representative Case-Study 3:

ERP Implementation at HPCL

Hindustan Petroleum Corporation Limited (HPCL) is a Fortune 500 company with an annual turnover of over `914.48 million for the financial year ended March 2007. The company has successfully implemented JD Edwards Enterprise One
ERP spanning about 400 locations and 4,000 employees across the nation. The ERP implementation programme was started in 2000. The availability of sound technical infrastructure was necessary for implementing such a large initiative. This meant building a centralized data centre where the servers and applications could be hosted as well as having efficient connectivity for all locations spread across India's geography. Around 400 locations were completed over a period of two and a half years. As each location was selected for inclusion, the related infrastructure (like WAN, lease
lines, VPN and VSATs) was built simultaneously depending on the availability.

As HPCL enjoys a national presence, it was important to determine the path for the ERP rollout. Several business processes were analysed for determining the points affecting the process look. The project was kicked off by a 25-member in-house team comprising representatives from all functional areas. After the completion of the first phase of the project, which included system configuration, more employees were inducted into the team and its size expanded to 100 people. In addition to this, a team of 100 consultants was also working on it. The locations due for

the “Go-Live” stage in a particular month were given top priority and a “work backwards” system was followed to arrive at separate tasks and their deadlines for those locations. These tasks included the procurement of hardware, applications for communication links, and testing and liaisoning with local people at the location. Post-implementation, the company noticed substantial improvement in efficiency. For example, before the implementation, the annual financial accounts closure would take approximately a month while the monthly closing would take 15 to 20 days. In 2007-08, the monthly and quarterly closing was completed in about five days while the annual closing took a mere 10 to 12 days.

The second major benefit of the centralized ERP implementation was that it compelled the company to look at various other services that could be offered to customers with the help of IT. It was also realized that they could improve transparency by making more information available to their customers, vendors, and transporters on a real-time basis. With the help of the Web, they can log in and check the status of loads, orders, and payments.

The implementation gave the company an opportunity to relook at all its business processes from the beginning. Several processes in manufacturing, planning, procurement, and employee benefits that were earlier done manually were automated. The ERP enabled the generation of various day-end MIS reports on a regular basis. This helped to revamp the way in which reporting was done to the top management. HPCL’s ERP implementation can potentially provide several clues to other large organizations wishing to derive benefits from ERP/IT adoption.

Source: Based on Abhishek Raval, “HPCL Refines Business Process with ERP Implementation,” accessed at http://biztech2.in.com/india/casestudies/enterprise-solutions/hpcl-refines-business-processes- with-erp-implementation/28091/0.

8.4 Representative Case-Study 4:

Design of Luxury Services

Designing an operating system for services is a different cup of tea altogether. There are specific issues that need to be factored in when we address the issue of design. Let us try to understand this with an example—that of offering luxury services to high–net worth individuals. According to an estimate by KSA Technopak, nearly 1.8 million Indian households earn more than USD 100,000 or more per year and spend about USD 10,000 or more on luxury or premium goods and services. This amounts to a market potential of USD 18 billion. Only select players in categories such as hotels and jewellery retail are offering such luxury services. What are the requirements for offering such services? First, companies need to carve out a unique position as customers are very individualistic and conscious about logos and brands. In the case of luxury services (and also in most other services), the shopping experience is very crucial. Once a customer walks through the door, he/she must be convinced to spend on the services and products offered. Raymond claims to have sold 1000 shirts priced at `12,000 and 100 suits at over `100,000 per piece in its Manzoni range in 2007.

Designing services is also about the tiny details that please the customer. Whether it is buying a very expensive handbag or spending an afternoon in a spa, service excellence is all about the nature and quality of staff interaction with the customers. Therefore, designing services with greater interaction with the customers require that the right people are in

place to deliver the experience. This is especially true of a luxury service where experience is at the root of brand building. The Murjani Group, which deals with luxury brands, believes in carefully selecting employees and putting them through an extensive training programme. This educates them about the brand and prepares them for special circumstances such as the arrival of a celebrity at the store. The Indian Hotels Company Limited, better known as Taj Hotels Resorts and Palaces, redesigned its structural appearance and repositioned its brands to achieve service excellence. Furthermore, it also put in place some unique processes and defined service standards. It invested substantially in training its employees. Another aspect of services is the need to address the issue of personalization.

Ferrari, the luxury carmaker, has a personalization programme called "One-to-One" for its top-end model, the 612 Scaglietti. The idea is to let the customers design their own car with the help of a company advisor.

Such service requirements place commensurate demand on the design of the operating system as well. Service systems must allow personalization, customer interaction, and variety. All these add to the complexity of the service offering. The experience of the service delivery process influences the service quality and lets the company build its brand. The design of services must address these issues and provide the operations manager with alternatives. The operations manager must also be aware of the implications of these alternatives. We shall take a closer look at these aspects in the chapter.

Source: **Based on P. Singh, "Luxurious Ride," *Business World*, 28 July 2008, pp. 36–48.**

9. Books:

Reference Books:

1. Operations Management- Monks, J.G., McGraw-Hill International Editions, 1987. ISBN 0-07-100579-X
2. Production and Operations Management- Pannerselvam. R, 2nd edition PHI. ISBN-978-81-203- 2767-2
3. Operations Management Theory and Practice- B.Mahadevan, 3 Edition, Pearson ISBN 978-96-325-4109-2
4. Productions & Operations management – Adam & Ebert.5th edition PHI
5. Modern Production/Operations Management- Buffa, Wiely Eastern Ltd., 4th edition
6. Production and Operations Management- Chary, S.N, Tata-McGraw Hill., 3rd edition
7. Operations management – James Dilworth. PHI, 3rd edition
8. Operations Management – Lee J Karjewski and Larry P Ritzman, strategy and Analysis, 6th Edn, Pearson Education Asia

Online Resource: https://nptel.ac.in/courses/112/107/112107238/
https://nptel.ac.in/courses/110/106/110106046/
https://nptel.ac.in/courses/110/106/110106045/

E-books: http://bookboon.com/en/operations-management-ebook

MOOC Course: https://www.edx.org/course/operations-management

10. Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	20	20
CIE-II	20	20
Assignments/Quizzes/ Case Study/Course Project/ Term Paper/Field Work	10	10
SEE	100	50
Total	150	100

11. Details of Assignment: (Not Limited to)

Assn.	Questions/Case Study/Quiz	Marks	CO	BLL	PI	CA	PO
1	Write answers to review questions	2	--	ALL	--	--	--
2	Solve the given numerical problems (Minimum of 10 numerical minimum two from each Unit)	2	--	ALL	--	--	--
3	Online quiz on all the units having a minimum of 20 questions	2	ALL	L4, L5, L6	--	--	--
4	Visit an industry and study how they manage their inventory and submit a report on the study	2	1	L5	4.1.1	4.1	4
5	Visit the various websites of major manufacturing industries and write a report on modern operations management tools used by companies		ALL	L5	--	--	--

12. SEE Model Question Paper

2 B A

B.E. Seventh Semester End Examinations, December 2019

Operations Management

Duration: 3 Hours Max. Marks: 100

NOTE: Answer any **FIVE** full questions selecting at least **ONE** from each unit.

Q.No		Question	Marks	BLL	CO	PI
		UNIT - I				
1.	a)	Define operations management. Explain the main functions of the operation management.	(06)	L2	1	2.1.1
	b)	Define productivity and discuss the different ways of improving productivity.	(08)	L2	1	2.1.2
	c)	Why system capacity is less than design capacity? Justify.	(06)	L2	1	2.3.1
2.	a)	Discuss the process layout with advantages and disadvantages	(08)	L2	2	2.1.2
	b)	A plant produces 15000 units per month. Find the beak even level, if the fixed cost is Rs 75000/month selling price is Rs 8/unit and variable cost Rs 2.50/unit. Also determine the expected profit or loss.	(06)	L3	3	11.1.1
	c)	Explain the objectives of plant layout.	(06)	L2	2	2.1.1
		UNIT - II				
3.	a)	Define forecasting and discuss the different types of demand pattern in forecasting.	(08)	L2	5	2.1.2

<table>
<tr><th colspan="2">Q.No</th><th>Question</th><th>Marks</th><th>BLL</th><th>CO</th><th>PI</th></tr>
<tr><td></td><td>b)</td><td>A company manufacturing tractors find that there exists a relationship between sales of tractor and index of agriculture income. The following data has been collected by the company for the last five years. Fit a regression line. Estimate the sales of tractors for the year 1993 for the given index of 250.
<table>
<tr><td>Years</td><td>1998</td><td>1989</td><td>1990</td><td>1991</td><td>1992</td></tr>
<tr><td>Demand 1000's</td><td>100</td><td>112</td><td>130</td><td>150</td><td>280</td></tr>
<tr><td>Index of agriculture income</td><td>125</td><td>140</td><td>180</td><td>190</td><td>220</td></tr>
</table></td><td>(12)</td><td>L3</td><td>5</td><td>3.3.1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.</td><td>a)</td><td>Define aggregate planning and explain the objectives of aggregate planning.</td><td>(04)</td><td>L2</td><td>5</td><td>2.1.2</td></tr>
<tr><td></td><td>b)</td><td>Discuss the different strategies of aggregate planning.</td><td>(06)</td><td>L2</td><td>5</td><td>2.1.1</td></tr>
<tr><td></td><td>c)</td><td>A company producing solar heaters has the information about production capacity and demand forecast given below:
<table>
<tr><td>Period</td><td>Regular time (RT)</td><td>One time (OT)</td><td>Subcontract</td></tr>
<tr><td>1</td><td>900</td><td>350</td><td>600</td></tr>
<tr><td>2</td><td>1000</td><td>350</td><td>600</td></tr>
<tr><td>3</td><td>1100</td><td>350</td><td>600</td></tr>
<tr><td>4</td><td>700</td><td>350</td><td>600</td></tr>
</table></td><td>(10)</td><td>L3</td><td>5</td><td>3.3.1</td></tr>
<tr><td></td><td></td><td>Demand forecast
<table>
<tr><td>Period</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Unit of demand</td><td>700</td><td>1000</td><td>2000</td><td>1200</td></tr>
</table>
Available inventory = 200 units, final inventory 150 units, regular time cost/unit = Rs 125 over time cost/units = Rs150
Subcontract cost/unit = Rs 175 inventory cost/unit/period = 25
Determine the optimum production levels and total cost using transportation method.</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>UNIT - III</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5.</td><td>a)</td><td>Define MRP, explain the different terminology of MRP.</td><td>(06)</td><td>L2</td><td>5</td><td>2.1.1</td></tr>
<tr><td></td><td>b)</td><td>Explain BOM with an example</td><td>(06)</td><td>L2</td><td>5</td><td>2.1.2</td></tr>
<tr><td></td><td>c)</td><td>Compute MRP and find the amount of inventory on land at the end of week.
<table>
<tr><td rowspan="2">Order Qty=500
Lt =4 weeks</td><td colspan="8">Week</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>Projected Requirements</td><td>150</td><td>150</td><td>150</td><td>150</td><td>200</td><td>200</td><td>180</td><td>320</td></tr>
<tr><td>Receipts</td><td></td><td></td><td>500</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>On hand at end of period =300</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Planned order release</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>(08)</td><td>L2</td><td>5</td><td>3.3.1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6.</td><td>a)</td><td>What factors significantly determine the design of service systems?</td><td>(06)</td><td>L2</td><td>4</td><td>2.1.2</td></tr>
</table>

<table>
<tr><th colspan="2">Q.No</th><th>Question</th><th>Marks</th><th>BLL</th><th>CO</th><th>PI</th></tr>
<tr><td></td><td>b)</td><td>How do address capacity issues in services?</td><td>(06)</td><td>L2</td><td>4</td><td>2.1.2</td></tr>
<tr><td></td><td>c)</td><td>How is service quality measured?</td><td>(08)</td><td>L2</td><td>4</td><td>2.1.1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>UNIT - IV</td><td></td><td></td><td></td><td></td></tr>
<tr><td>7.</td><td>a)</td><td>Discuss SPT and EDD priority rules for sequencing the jobs.</td><td>(06)</td><td>L2</td><td>5</td><td>3.1.1</td></tr>
<tr><td></td><td>b)</td><td>Consider the following single machine problem. Find optimal sequence which will minimize the member of tardy jobs.
<table>
<tr><td>Job(i)</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>ti</td><td>15</td><td>8</td><td>17</td><td>9</td><td>12</td></tr>
<tr><td>dj</td><td>20</td><td>15</td><td>30</td><td>17</td><td>25</td></tr>
</table></td><td>(08)</td><td>L3</td><td>5</td><td>3.3.1</td></tr>
<tr><td></td><td>c)</td><td>Consider the following flow shop problem.
<table>
<tr><td>Job</td><td>M/c1</td><td>M/c2</td><td>M/c3</td></tr>
<tr><td>1</td><td>10</td><td>15</td><td>23</td></tr>
<tr><td>2</td><td>8</td><td>10</td><td>7</td></tr>
<tr><td>3</td><td>12</td><td>7</td><td>10</td></tr>
<tr><td>4</td><td>15</td><td>20</td><td>06</td></tr>
</table>
Find the optimal schedule for the above problem using CDS Heuristic method.</td><td>(06)</td><td>L3</td><td>5</td><td>3.3.1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.</td><td>a)</td><td>Discuss the Johnson’s rule for solving flow shop scheduling problem with example</td><td>(08)</td><td>L2</td><td>5</td><td>2.1.2</td></tr>
<tr><td></td><td>b)</td><td>An use the graphical method to minimize the time headed to process the following jobs on m/c. Also find job which should be done first and calculate total time required to complete the jobs.
<table>
<tr><td rowspan="2">Job 1</td><td rowspan="2">Sequence time</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr>
<tr><td>2</td><td>3</td><td>4</td><td>6</td><td>2</td></tr>
<tr><td rowspan="2">Job 2</td><td rowspan="2">Sequence time</td><td>C</td><td>A</td><td>D</td><td>E</td><td>B</td></tr>
<tr><td>4</td><td>5</td><td>3</td><td>2</td><td>6</td></tr>
</table></td><td>(12)</td><td>L3</td><td>5</td><td>3.1.3</td></tr>
</table>

BLL-Bloom’s Learning Level
CO- Course Outcome
PI-Performance Indicator

Dr. C.M.Javalagi
Faculty- Incharge

Dr.C.M.Javalagi
Head of the Deprtment

BASAVESHWAR ENGINEERING COLLEGE, BAGALKOTE

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING

COURSE PLAN

Title of course	**:**	**Plasticity and Metal Forming**	**Course code**	**:**	**UIP702C**
Credits	**:**	**03**	**Contact hours / Week**	**:**	**03**
Total hours	**:**	**42**	**Tutorial hours**	**:**	**NA**
CIE marks	**:**	**50**	**SEE marks**	**:**	**100**
Semester	**:**	**7th**	**Year**	**:**	**2023 - 24**
Name of the faculty	**:**	**Dr. D. G. Mallapur**	**Name of the head of the department**	**:**	**Dr. C. M. Javalagi**

Prerequisites: Mechanical behaviour of materials

1. **Course objectives: This course aims to provide students with the theoretical foundations and methodology necessary for solving metal-forming technologies on the principles of plastic deformation and theory of plasticity. Students will acquire knowledge necessary for a creative and complex engineering solution of the technologies of metal-forming processes.**

Course Objectives:

1.1	**To impart knowledge on various aspects of metal forming and to develop the skill to analyse various metal forming processes and to have a comprehensive analysis of metal forming principle to be applied in actual practice.**
1.2	**To impart knowledge about principles and criteria of yielding during forming of metals.**
1.3	**To prepare students understand the analysis of different bulk metal forming processes following different analysis approach.**
1.4	**To understand the process mechanics with role of different controlling process parameters.**
1.5	**Students will understand effect of various metal forming method on the mechanical properties of automotive parts and will learn from the metal forming theory their relationship with material principles.**
1.6	**Students strengthen their knowledge from the forging, rolling, extrusion, deep drawing like processes and their analysis.**

Course Outcomes:

	At the end of the course the student should be able to:
2.1	**Attain proficiency in basic metal forming processes/techniques and analyze the concept of stress, strain, flow curve and yielding of materials according to different yield theory for a given state of stress.**
2.2	**Explain principle of forging, determination of pressure distribution, forging load its application and illustrate about the rolling process/operation using different analysis approach to calculate force and pressure distribution.**
2.3	**Understand and evaluate process of excursion its analysis on the process mechanics and evaluate the variables affecting rod and wire drawing processes.**
2.4	**Describe the manufacturing of tube drawing process and its analysis and get-well acquaintance with high energy rate forming processes.**

2. Course Articulation Matrix: Mapping of Course outcomes (CO) with Programme outcomes (PO) and Programme specific outcomes (PSO)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
No	Programme Outcomes → / Course Outcomes	Engineering knowledge	Problem analysis	Design / Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	The Industrial and Production Engineering Graduates will be able to effectively design, implement, improve and manage systems /activities in manufacturing and service organizations.	Use the knowledge and skills of industrial engineering to model and analyse the real life problems to develop solutions	Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices
The students will be able to:																
1	Attain proficiency in basic metal forming processes/techniques and analyse stress, strain, yielding of material according to different yield theory for a given state of stress.	3	2	------	------	-----	------	-----	------	------	------	------	------	3	1	2
2	Explain principle of forging, determination of pressure distribution, forging load its application and illustrate about the rolling process/operation using different analysis approach to calculate force and pressure distribution.	3	2	------	------	-----	------	-----	------	------	------	------	------	3	1	2
3	Understand and evaluate process of excursion its analysis on the process mechanics and evaluate the variables affecting rod and wire drawing processes.	3	2	------	------	-----	------	-----	------	------	------	------	------	3	1	2
4	Describe the manufacturing of tube drawing process and its analysis and get-well acquaintance with high energy rate forming processes.	3	2	------	------	-----	------	-----	------	------	------	------	------	3	1	2

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Competencies addressed in the course and corresponding performance indicators Programme outcome:

PO	Competency (CA)	Performance Indicators (PI)
PO1	1.2 Demonstrate competence in basic sciences	1.2.1 Apply laws of natural science to an engineering problem
	1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply fundamental engineering concepts to solve engineering problems
	1.4 Demonstrate competence in specialize engineering knowledge to the program	1.4.1 Apply Industrial and Production engineering concepts to solve engineering problems.
PO2	2.1 Demonstrate an ability to identify and formulate complex engineering problem	2.1.2 Identify engineering systems, variables, and parameters to solve the problems
	2.2 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.2 Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions 2.2.3 Compare and contrast alternative solution processes to select the best process
	2.4 Demonstrate an ability to execute a solution process and analyse results	2.4.1 Apply engineering mathematics and computations to solve mathematical models produce and validate results through skilful use of contemporary engineering tools and models

Unit - I

Course Content:

Hours required	Topics to be covered	Mode of delivery
01	Introduction and classification of forming processes, mechanics of metal working of metals.	Chalk and talk in classroom and Lecture combined with discussions
01	Flow curve, true stress and true strain and related problems.	
02	Introduction, stress tensor, state of stress, components of stresses and stress invariants.	
03	Problems related to calculation of principal stresses and directions, stress deviator.	
03	Plasticity conditions - Von Mises's and Tresca yield criterion and numerical problems.	

Review Questions:

SN	Review Questions	CO	BLL	PI addressed
1	Briefly explain the flow curve.	1	L2	1.3.1
2	Define the metal forming processes on the basis of the type of forces applied to the work piece as it is formed into shape.	1	L2	2.2.2
3	Describe the invariants of the stress tensor of octahedral stresses for the case of uniaxial state of stress.	1	L2	2.2.2
4	Explain the theories available to predict the incipience of plastic yielding in ductile metals.	1	L3	1.3.1
5	Derive $\sigma = s(1+e)$, where σ is the true stress, s is the conventional stress and e the strain.	1	L3	2.4.1
6	Identify the three principal stresses if the state of stress at a point is given by $\sigma_{xx} = 50$, $\sigma_{yy} = -30$, $\sigma_{zz} = -100$, $\tau_{xy} = 50$, $\tau_{xz} = -40$ and $\tau_{yz} = 30$, (All dimensions are in MPa).	1	L4	2.4.1

Unit - II

Course Content:

Hours required	Topics to be covered	Mode of delivery
01	Introduction and classification of forging operation.	Chalk and talk in classroom and Lecture combined with discussions
01	Forging equipment and forging defects.	
04	Pressure distribution calculation - forging of a rectangular plate and circular disc with numerical problems.	
02	Introduction and classification of rolling mills, hot and cold rolling and defects in rolled products.	
04	Forces and geometrical relationship in rolling and rolling analysis of a strip with numerical problems.	

Review Questions:

SN	Review Questions	CO	BLL	PI addressed
1	Define forging and brief the different operations and processes.	2	L2	1.4.1
2	Briefly classify the forging equipment's.	2	L2	1.4.1
3	Derive an expression for average pressure during strip forging in the sliding region.	2	L3	1.4.1
4	Explain the main parameters in the rolling process.	2	L2	1.4.1
5	Briefly classify the rolling mills and explain planetary rolling mill with a neat sketch.	2	L2	1.4.1
6	Explain with a neat sketch the various forces and geometrical relationships in rolling process.	2	L3	1.4.1
7	If maximum reduction in rolling of slab is from 25 to 20mm, calculate the value of coefft of friction. Roll diameter as 500mm. Also find the length of projection of arc of contact.	2	L3	2.4.1

Unit - III

Course Content:

Hours required	Topics to be covered	Mode of delivery
01	Introduction and classification of extrusion.	Chalk and talk in classroom and Lecture combined with discussions
01	Hydrostatic extrusion and equipment's.	
02	Introduction and analysis of extrusion process - extrusion of cylindrical rod and strip with friction.	
01	Introduction rod and wire drawing process	
02	Introduction and analysis of drawing process - drawing of cylindrical rod and strip with friction.	
03	Numerical Problems related to extrusion and drawing processes.	

Review Questions:

SN	Review Questions	CO	BLL	PI addressed
1	Briefly classify the extrusion processes.	3	L2	1.4.1
2	Derive the general equation/expression applicable to extrusion and drawing of cylindrical rod with friction.	3	L3	1.4.1
3	Explain wire drawing process.	3	L2	1.4.1
4	A strip of steel of initial width of 5cm is drawn through tapered dies to a final width of 4.5cm in plain strain conditions. Taking $\mu = 0.03$, $\alpha = 12°$, yield stress = $280N/mm^2$, determine the draw stress when back pull is zero and 20N. Also calculate the maximum reduction.	3	L3	2.4.1
5	A round billet made of 70-30 brass is extruded at a temperature of 675°C. The billet dia. is 125 mm, and the diameter of the extrusion is 50 mm. Calculate the extrusion force required. For brass, extrusion constant k = 250MPa.	3	L3	2.4.1

Unit - IV

Course Content:

Hours required	Topics to be covered	Mode of delivery
01	Introduction of tube drawing process.	Chalk and talk in classroom and Lecture combined with discussions
03	Analysis of tube drawing process.	
01	Introduction to high energy rate forming processes, advantages and disadvantages.	
02	Explosive forming process.	
03	Explosive forming and electromagnetic forming processes.	

Review Questions:

SN	Review Questions	CO	BLL	PI addressed
1	Explain in brief the process of tube drawing.	4	L2	1.4.1
2	Explain in brief as to how tube drawing can be achieved by tube sinking.	4	L2	1.4.1
3	What do you understand by unconventional forming processes? How do you classify them?	4	L2	1.4.1
4	Brief important high energy rate forming processes.	4	L2	1.4.1
5	Describe explosive forming of metals and two basic systems for this process.	4	L2	1.4.1
6	Describe with a sketch the electro-hydraulic forming process.	4	L2	1.4.1
7	Describe the electro-magnetic forming process.	4	L2	1.4.1
8	Derive the draw stress $\sigma_{xa}/\sigma_{o'} = (1 + B)/B [1 - (h_a/h_b)^B] + \sigma_{xb}/\sigma_{o'} (h_a/h_b)^B$ in case of tube drawing with a stationary mandrel.	4	L3	2.4.1
9	Determine the drawing stress during tube drawing using fixed and moving mandrel. Initial internal diameter is 50mm. Final internal diameter is 48.75mm. Initial and final wall thickness is 2.5mm and 1.75mm. $\alpha = 15°$ and $\mu = 0.1$ and $\sigma_0 = 350MPa$.	4	L3	2.4.1

Reference Books:

1) Theory of Plasticity and Metal Forming Processes, Dr. Sadhu Singh, Khanna Publishers, New Delhi.
2) Mechanical Metallurgy by George E. Dieter, Adapted by David Bacon, (SI Metric Edition), McGraw-Hill Book Company.
3) Introduction to Industrial Mechanical Working Process by G. W. Rowe.
4) Theory of Metal forming and Metal cutting, K. P. Sinha and S. C. Prasad, Dhanpat Rai and Sons, New Delhi.
5) Metal Forming Processes, G. R. Nagral, Khanna Publishers, New Delhi.

Evaluation Scheme:

Assessment	Marks	Weightage
CIE - I	20	20
CIE - II	20	20
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	10	10
SEE	100	50
Total	150	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1 - MCQ	05	ALL	--	--	1,2
Assignment 2 - Quiz	05	ALL	--	--	1,2

Dr. D. G. Mallapur
Faculty In-charge

Dr. C. M. Javalagi
Head of the Department

BASAVESHWAR ENGINEERING COLLEGE, BAGALKOTE
DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING

COURSE PLAN

Title of Course	**:**	**Just in Time Manufacturing**	**Course Code**	**:**	**UIP028E**
Credits	**:**	**03**	**Contact Hours/ Week**	**:**	**03**
Total Hours	**:**	**40**	**Tutorial Hours**	**:**	**--**
CIE Marks	**:**	**50**	**SEE Marks**	**:**	**100**
Semester	**:**	**VII**	**Year**	**:**	**2023-24**

Prerequisites:

Industrial Engineering and Management

1. **Course Objectives: The course is aimed at providing the theoretical knowledge about the JIT philosophy that could help improve the organizational productivity by means of reducing wastage of resources. Students will gain knowledge necessary for a creative and complex engineering solution of the technologies of metal-forming processes.**

	The Course objectives are:
1	To provide the theoretical background of JIT philosophy
2	To equip students with understanding of Kanban system
3	To prepare students to evaluate and analyse the Design, Development and Management of JIT Manufacturing Systems emphasisng on Plant configurations and flow analysis planning and control systems
4	To impart knowledge about the organisations which have implemented the JIT and the benefit they have
5	To make students to investigate the concept of Supply Management for JIT in connection with JIT purchasing, with special reference to buyer-seller relationship problems in implementation of JIT purchasing

Course Outcomes:

	At the end of the course the student should be able to:
1	Comprehend the key features and frameworks of Just-In-Time and Kanban sy-stems in detail.
2	Evaluate the Design, Development and Management of JIT Manufacturing Systems emphasisng on Plant configurations and flow analysis planning and control systems, quality management system, product design, human resource management, flexible workforce system and creation and maintenance of teams for JIT
3	Analyze the framework for implementation of JIT considering various risks associated.
4	Investigate the concept of Supply Management for JIT in connection with JIT purchasing, with special reference to buyer-seller relationship problems in implementation of JIT purchasing

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
No	**Programme Outcomes / Course Outcomes**															
The students will be able to:																
1	Comprehend the key features and frameworks of Just-In-Time and Kanban systems in detail.	2		1					1				1	1		
2	Evaluate the Design, Development and Management of JIT Manufacturing Systems emphasisng on Plant configurations and flow analysis planning and control systems, quality management system, product design, human resource management, flexible workforce system and creation and maintenance of teams for JIT	2	3	2	2		3		2		2		2		2	
3	Analyze the framework for implementation of JIT considering various risks associated.					2			2	2		3	2	2		
4	Investigate the concept of Supply Management for JIT in connection with JIT purchasing, with special reference to buyer-seller relationship problems in implementation of JIT purchasing					2		2			2		2			2

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome:Any of 1 to 12 PO's:

Competency	Indicators
PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1.4.1** Apply Industrial and Production engineering concepts to solve engineering problems
PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	**2.2.2** Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions
PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	**3.4.2** Generate information through appropriate tests to improve or revise the design
PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	**5.2.1** Identify the strengths and limitations of tools for (i) acquiring information, (ii)modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs.

Course Content:

Unit - I

Hours Required	Topic to be covered	Mode of Delivery
02	**JIT-An Introduction:** Spread of JIT movement, the New Production System Research Association of Japan, some definitions of JIT, core Japanese practices of JIT, creating continuous manufacture, enabling JIT to occur, basic element of JIT, benefits of JIT.	**Chalk and talk in classroom/Lecture combined with discussions**
02	**Modern Production System:** Key feature of Toyota's Production System, basic framework of Toyota Production System.	ICT based
03	**KANBAN SYSTEM –** other types of kanban's, kanban rules, adapting to fluctuations in demand through kanban, whirligig, determining the number of kanban's in Toyota Production System,.	**Chalk and talk in classroom/Lecture combined with discussions,** ICT based
03	detailed kanban system example, supplier kanban and the sequence schedule for use by suppliers	ICT based

Review Questions:

Review Questions	CO	BLL	PI addressed
Describe the historical development of JIT	1	2	1.4.1
Explain the functions of NPSRA	1	2	1.4.1
What are the key features of Toyota Production System?	1	2	2.2.2
Describe the basic framework of Toyota Production System.	1	2	3.4.2
List and explain the different types of Kanban	1	3	2.2.2

Unit - II

Hours Required	Topic to be covered	Mode of Delivery
01	**Design, Development and Management of JIT Manufacturing Systems:** Plant configurations and flow analysis for JIT manufacturing	ICT based
03	comparison of JIT's "demand pull" system with conventional "push type", planning and control systems, quality management system for JIT,	ICT based
03	product design for JIT, human resource management in JIT, flexible workforce system at Toyota, creation and maintenance of teams for JIT,	ICT based

03	union organization and conduct of industrial relations in JIT, interface of JIT with advanced manufacturing technology, assessing performance in JIT manufacturing systems, product costing information systems in JIT manufacturing, an example of overhead allocation in JIT, potential for developing countries, potential for small manufacturing	ICT based

Review Questions:

Review Questions	CO	BLL	PI addressed
Explain the criterion for plant configurations and flow analysis for JIT manufacturing	2	2	3.4.2
Differentiate between Pull and Push systems of production	2	2	5.2.1
Describe the importance of human resource management in JIT	2	2	5.2.1
How is performance of JIT implementation assessed in an organisation?	2	2	3.4.2
What role does the information system play in JIT manufacturing?	2	3	5.2.1

Unit - III

Hours Required	Topic to be covered	Mode of Delivery
02	**Framework for Implementation of JIT:** Implementation risk, risks Due to inappropriate understanding of JIT,	ICT based
03	risks due to technical, operational and people problems, risks associated with kanban system,	ICT based
02	some important activities to be performed during implementation,	ICT based
03	steps in implementation, project work approach to implementation, conclusion.	ICT based

Review Questions:

Review Questions	CO	BLL	PI addressed
What are the various risks associated with the implementation JIT?	3	2	2.2.2
How can an organisation overcome the risk due to technical, operational and people related problems?	3	2	3.4.2
Describe the step by step process involved in implementation JIT	3	2	5.2.1

Unit - IV

Hours Required	Topic to be covered	Mode of Delivery
02	**Supply Management for JIT:** JIT purchasing-the Japanese way, some studies in JIT purchasing,	ICT based
03	experience of implementation organizations, surveys of JIT purchasing,	ICT based
03	buyer-seller relationship in JIT purchasing, quality certification of suppliers in JIT purchasing, some	ICT based
03	problems in implementation of JIT purchasing, reduction of freight costs in JIT purchasing, monitoring supplier performance for JIT purchasing, audit in JIT purchasing, implementation of JIT to international sourcing, frequency of shipments, inventory policy, supplier reaction capability, quality, communication sole sourcing, delivery performance and supplier flexibility, conclusion**.**	ICT based

Review Questions:

Review Questions	ULO	BLL	PI addressed
Describe the mode of purchasing the Japanese manufacturers adapted during the implementation of JIT	4	2	3.4.2
Enumerate the success stories of the organisations that used JIT purchasing	4	2	3.4.2
Describe the buyer seller relationship required in JIT purchasing	4	2	5.2.1
What are the problems associated with JIT purchasing?	4	3	5.2.1

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	**20**	**20**
CIE-II	**20**	**20**
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	**10**	**10**
SEE	**100**	**50**
Total	**150**	**100**

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1	**Quiz (5)**	**1, 2**	**3.4.2**		**3**
Assignment 2	**Presentation of a case study (5)**	**1, 2, 4**	**5.2.1**		**5**

Reference Books *
1. **Just In Time Manufacturing** - M.G. Korgaonker, Macmillan India Ltd.- 1992, EAN: 978033326635 2. **Japanese Manufacturing Techniques -** Richard J. Schonberger," The Free Press – Macmillan Pub. Co., Inc. New York - 1988.

Faculty **Head of the department**