



UNIVERSITAS  
INDONESIA

*Veritas, Probatas, Iustitia*



IMTI  
FTUI  
2017

# GUIDELINES



# ISEEC

INDUSTRIAL AND SYSTEMS ENGINEERING COMPETITION

## 2018

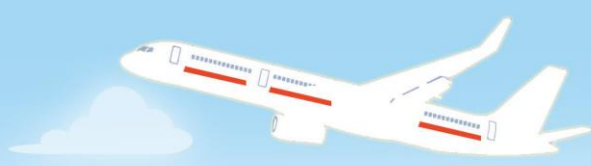


AIRPORT



Website : [www.iseec-ui.com](http://www.iseec-ui.com)

Email : [info@iseec-ui.com](mailto:info@iseec-ui.com)



## REGISTRATION GUIDELINE

### A. FOREWORD

Welcome to ISEEC 2018, Solution Seekers!

Industrial and Systems Engineering Competition (ISEEC), previously known as Lomba Keilmuan Teknik Industri (LKTI), is an annual competition held by Ikatan Mahasiswa Teknik Industri Universitas Indonesia that was first organized in 2001. As the oldest and the most prestigious industrial engineering event held in Jakarta-Indonesia for 17 years, it portrays real-world industrial situations that would require the use of all core proficiencies to identify, define, and specify. We are delighted to have you join us as we have relished establishing the top competition of industrial engineering students over the past decade. Come to solve industrial problems, simulate real-world cases, provide the best alternative, and be the champion!

With "Aviation Industry" as the theme of ISEEC 2018, the complex yet comprehensive stages provided makes us the perfect event for you, the best industrial engineering students across the globe, as you will solve real-world based challenges which will be given. Furthermore, many interesting events will be waiting as we ensure you will be thrilled by the glory of Jakarta.

The future awaits, trailblazer!

With best regards,

Project Officer of ISEEC 2018

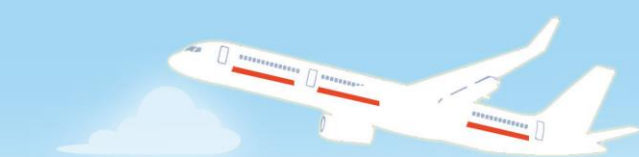
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## B. VISION AND MISSION

**Vision:** ISEEC becomes the pioneer of scientific Industrial Engineering competition around the world and gives contribution to Industrial Sector with Industrial and System Engineering's core competence.

**Mission:**

1. Prepare and Implement its competition and main event.
2. Establish and build good relationship and team work with stakeholders in order to manage a successful competition and event.

## C. OBJECTIVES

1. Provide a place for participants to understand the conditions of current Industry conditions as it is presented through the theme of the ISEEC.
2. Provide a gathering for students of Industrial Engineering or Systems or similar Study Programme in different Regional and International areas.
3. To test the Participants' ability and understanding to the subject of Industrial and Systems Engineering.
4. To find and develop long-term applicable solutions to industry issues by including the aspects of economic, social and environmental.

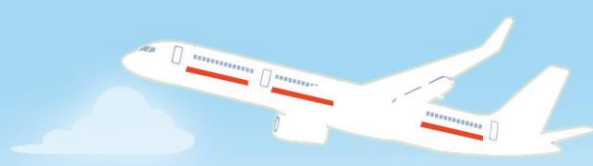
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## D. PREFACE

Air transportation has become one of the most important modes of transport in Indonesia. The increasing passenger demand for both domestic and international flights has driven this importance and it has required airport to be more competitive in managing its infrastructure and operational deliveries. One of the imminent challenge because of this spiking demand is the increasing runway traffic for both take-off and landing purposes, indicating a higher density of day-to-day flight schedules. The circumstance is also pushed by the increasing low-cost carrier offers from several airlines to cater more passenger acquisition through cheaper ticket fares and minimalist flying services.

One of Indonesia International airport is now ranked as the 8<sup>th</sup> world busiest airport in terms of passenger numbers by Airports Council International. The airport was designed to accommodate 22 million passengers a year, but in 2016, it is reported that it carried 89.35 million passengers with 398,722 aircraft movements. The number grows 16.6% compared to the previous year with 76.5 million passengers. The figure is still expected to rise as Indonesia's air transport seems likely to grow in the coming years. In responding to these challenges, it is important for airport managing bodies to pay attention to the airport's service capacity in coping with increasing passengers and highly dense aircraft traffic.

One of challenging issues that Airport managing body should take a deeper attention is the cost of delays. The delay is in the form of additional time which is required to perform operations, either for takeoff or landing. The impacts are not only detrimental to prospective passengers but also airlines. The amount of the cost of annual air travel delay is certainly large. Based on Indonesia National Air Carrier Association (INACA), for every 20 minutes of delay, amount losses are interpreted up to \$1000 US Dollar. These costs would be even larger if it were possible to quantify the frustration of millions of travelers who are experiencing more delays in a more crowded system.

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Understanding the urgency in this issue, this year's ISEEC will carry the theme of **"Revitalizing the Aviation Industry: Delivering Solutions for Airport Issues through Strategic Management"**. By bringing this theme, Industrial Engineering students are expected to act as problem solvers as well as agents of change in the aviation industries.

## E. EVENT SUMMARY

The competition will consist of two main rounds: *the preliminary round* and *the elimination rounds*. Each team must consist of four (4) members. The details about each round will be as follow:

### 1. Preliminary Stage - Industrial and Systems Engineering Quotient (ISEQ)

Preliminary Stage is an online test selection which will test participants' understanding about Industrial Engineering. Online test can be accessed via ISEEC 2018's official website, which is accessible to the selected participants that passes on file selection phases only. The top 20 teams with the highest score will be invited to join the next stages of ISEEC 2018. Nonetheless, should there be more than 2 teams from the same institution in the top 20 teams, only 2 teams of each participating institution will pass the preliminary stage.

**Date** : 8<sup>th</sup> – 11<sup>th</sup> January 2018

**Form of Competition** : *Online Test*

**Number of Participants** : All Eligible Teams

### 2. Aviation Industry Expert Talks – February 19<sup>th</sup> 2018

Before the competition, there will be a talk show which aims to give participants high-quality information and insights about Aviation Industry. The talk show will have several guest speakers consisted of experts, government officials, and lecturers from Department of Industrial Engineering of Universitas Indonesia.

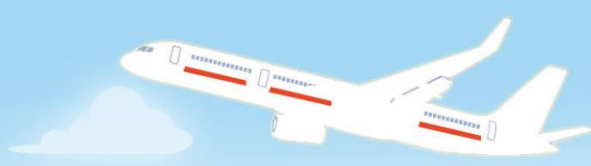
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What follows after is the **elimination stage** of ISEEC 2018:

### 3. 1<sup>st</sup> Elimination Round – Analytical Industrial and Systems Engineering Quiz

The goal of this stage is to test the basic knowledge and concept of the participants, referring to scientific matters of Industrial Engineering in general. Participants will be given questions regarded to the subject in the syllabus.

**Date** : **February 20<sup>th</sup> 2018**

Form of Competition : *Trivia Quiz*

Number of Participants : 20 teams

### 4. 2<sup>nd</sup> Elimination Round – Business Simulation

In this stage, all the groups will play a serious board game simulation. All participants will work with an airport simulator and apply the best strategy to obtain an optimum result. Only five groups that will pass this stage after accumulation points from 1<sup>st</sup> stage and 2<sup>nd</sup> stage.

**Date** : **February 21<sup>st</sup> 2018**

Form of Competition : *Simulation Gaming*

Number of Participants : 20 teams

### 5. Final Round – Real Case Study

The final stage will showcase the top five groups challenged as Industrial Engineers to solve a real case about airport operational problems from the perspective of strategic management. The solutions that are offered will be presented to a panel of judges, which will have academicians and practitioners. From this stage, the winner of ISEEC 2018 will be decided.

**Date** : **February 23<sup>rd</sup> 2018**

Form of Competition : *Real Case Study*

Number of Participants : 5 teams

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## F. REGISTRATION TIMELINE

### 2017

22 Nov - 31 Dec	Registration period
31 Dec	Payment deadline for preliminary fee

### 2018

05 Jan	Announcement for teams that are eligible for preliminary stage
8 – 11 Jan	Preliminary stage
25 Jan	Announcement of breaking teams
28 Jan – 9 Feb	Re-Registration and payment period for breaking teams
11 Feb	Online technical meeting

## G. REGISTRATION POLICY

### For ALL participants (national and international teams)

1. All participants must be registered from the same institution and currently are still enrolled in the Industrial/Systems Engineering or Operation Management major.
2. Each team must consist of four members.
3. All participants must have completed **at least three (3) semester of their course** in the Industrial/Systems Engineering or Operation Management major. **A formal letter**

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confirming the active student status of each participant must be included when completing the registration form.

4. There is **no limit** of the number of teams that each participating institution can enter **for the preliminary stage**. Nonetheless, **only 2 teams** of each participating institution **will pass the preliminary stage**.
5. **All participants must fill the registration form on our website ([www.iseec-ui.com](http://www.iseec-ui.com)) and upload the required attachments to our website (in .pdf format)**. Those attachments are:
  - a. A scanned version of each participant's student card or ID.
  - b. Curriculum Vitae (CV) of each participant. No particular format needs to be followed.
  - c. Formal individual photo for each participant (4x6).
  - d. A scanned version of a formal letter signed by each participant's Head of Department (or anyone with equal status as head of department), confirming each participant's active status as Industrial/Systems Engineering or Operation Management student.
6. For teams that register for the preliminary stage, **each will be charged a preliminary-round's fee of IDR 300,000 or USD 25**.
7. For breaking teams\*), **each team will be required to pay IDR 4,000,000 or USD 350** which covers the competition fee for elimination round and lodging expenses.

\*) Breaking teams are teams that have passed the preliminary stage.

## H. PAYMENT POLICY

### a) Preliminary Stage

All payments must be made in full (**IDR 300,000** for national/Indonesian teams or **USD 25** for international teams) to either:

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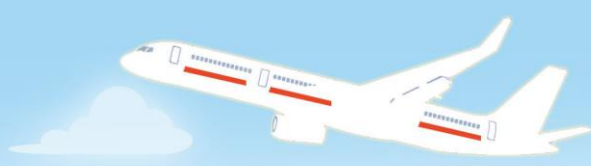






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Email : [info@iseec-ui.com](mailto:info@iseec-ui.com)



Bank : Bank Central Asia

Swift Code/BIC : CENAIJJA

Account Number : 5271593849

Name : Klairine Mariana Rustan

**or to:**

Bank : Bank Mandiri (PERSERO), PT

Swift code/BIC : BMRIIDJA

Account Number : 1570005816187

Name : Klairine Mariana Rustan

Please make sure the full amount is received by us before the deadline (31 Dec 2017). Any additional costs should be charged to the sender. If transactions via the regular banking system are impossible please inform us before the deadline. After completing the payment, the scanned version of the proof of the payment (in .pdf format) must be uploaded to our website [www.iseec-ui.com](http://www.iseec-ui.com).

### **b) Elimination Stage\*)**

All payments must be made in full (IDR 4,000,000 for national/Indonesian teams or USD 350 for international teams) to either:

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Swift Code/BIC : CENAIJJA

Account Number : 5271593849

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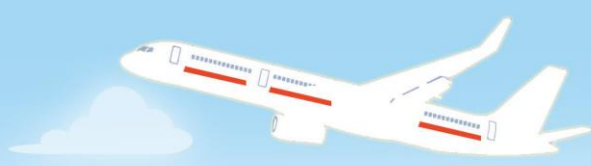
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Name : Klairine Mariana Rustan

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\*) This payment only applies once a team is declared as **breaking team and is eligible for the elimination stage.**

## I. PRIZE

The winning teams would receive prizes as follows:

**1st = \$ 2,000**

**2nd = \$ 1,250**

**3rd = \$ 750**

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## J. SYLLABUS

No.	Subject	Description	Source of Materials
1	COST AND ACCOUNTING	Accounting Equation. Basic Production Cost of Manufacturing. Cost of Goods Sold (COGS). Financial Report. Inventory Costing Method. Depreciation. Working Capital. Profit Planning and Control. Overhead Cost Allocation. Activity Based Costing. Job Order Cost Accounting. Process Cost Accounting.	1) Oswald, P. F. Cost Analysis and Estimating for Engineering and Management, 1st ed. USA: Pearson Education Inc. 2004 2) Horngren, Charles T. Cost Accounting. 14th ed. Prentice-Hall, Inc. 2012

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2	DISTRIBUTION AND LOGISTICS SYSTEM	<p>Business Introduction. Strategy and Planning. Resource Purchasing. Methods. Shortest Path. Travelling Salesman Problem. Vehicle Routing Problem (ROUTER). Reverse Logistics. Location Theory. Network Planning. Business Logistics Overview.</p> <p>Logistics Enterprise Planning. Transportation. Shortest Path. Warehousing. Location Theory. Network Planning.</p>	<p>1) Chopra, Sunil. 2004. Supply Chain Management: Strategy, Planning and Operation. Prentice Hall International, Inc., New Jersey</p> <p>2) Ghiani, Gianpaolo. 2004. Introduction to Logistics Systems Planning and Control. California: John Wiley and Sons, Ltd.</p> <p>3) Ballou, Ronald. H. 2004. Business Logistics Management, Prentice Hall International, Inc., USA</p> <p>4) Fleischmand et.al. 2003. Quantitative Modelling in Reverse Logistics, Springer.</p> <p>5) Bowersox, D. J., Closs, D.J., Cooper, B. 2010. Supply Chain Logistics Management, 3rd ed. McGraw-Hill: New York</p>
3	ENGINEERING ECONOMY	<p>Introduction. Equivalent. Replacement. Compound Interest. Benefit Analysis. Period. Depreciation. Break Event Analysis. Tax.</p> <p>Cashflow. Time Value of Money. Return Analysis.</p>	<p>1) Newnan, Donald G. Engineering Economic Analysis. 10th ed. Oxford University Press. 2009</p> <p>2) Blank, L., &amp; Anthony, T. Engineering Economy. 7th ed. McGraw-Hill. 2012</p>
4	HUMAN FACTORS IN ENGINEERING AND DESIGN	<p>Introduction. Design. Information Input. Physical Work and Manual Materials Handling. Applied Anthropometry. Interpersonal Aspects in Engineering and Design.</p> <p>Interface. Information Input. Applied Anthropometry.</p>	<p>1) Sanders, Mark. et al. 1993. Human Factors in Engineering and Design, 7th ed. New York: McGRAW-HILL</p>

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		Climate and Lights. Human Error and Safety.	
5	INDUSTRIAL FACILITIES	Sensors and Actuator. PLC. Pneumatic System. Plant Electrical System. Communication System.	1) Eric Teicholz. 2001. Facility Design and Management Handbook. McGraw-Hill Education.
6	INDUSTRIAL FEASIBILITY ANALYSIS	Project Feasibility Study. Scope and Functions. Market and Marketing Aspects. Technical and Technology Aspects. Operations Aspects. Environment Aspects. Legal Aspects. Economy Aspects. Financial Aspects.	1) W. Behrens, P.M. Hawranek. 1991. Manual for the preparation of industrial feasibility studies. UNIDO
7	INDUSTRIAL MARKETING	Principles of Marketing. Global Marketing. Consumer Behaviors. Marketing Mix (Product). Marketing Mix (Price). Marketing Mix (Place). Marketing Mix (Promotion). Marketing System. Selling Skill. Blue Ocean Strategy. Strategic Brand Management. Market Research.	1) Philip Kotler. 2013. Principles of Marketing. 15th edition. Prentice Hall. 2) Renée Mauborgne, W. Chan Kim. 2015. Blue Ocean Strategy, Expanded Edition: How To Create Uncontested Market Space And Make The Competition Irrelevant. Harvard Business Review Press. 3) John Burnett. 2008. Core Concepts of Marketing. Global Text Project. 4) Philip Kotler. 2011. Marketing Management. 15th Edition. Pearson.

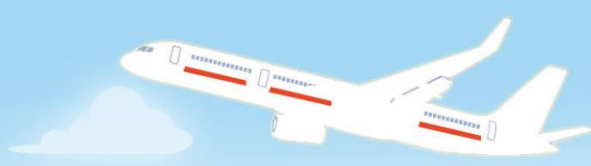
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8	INDUSTRIAL PSYCHOLOGY	Overview. Organizational Behavior. Individual Behavior Basics. Work Values, Behaviors, and Satisfaction. Individual Perceptions and Decision Making. Motivational Concepts and Its Implementation in Organization. Group Behavior Basics. Teamwork. Case Studies.	Walter C. Borman, Daniel R. Ilgen and Richard J. Klimoski. 2003. Handbook of Industrial and Organizational Psychology. John Wiley & Sons, Inc.
9	INDUSTRIAL SIMULATION	Modeling and Simulation Projects Methodology. User Requirement Development. Conceptual Modeling. Model Development. Validation and Verification. Simple Feasibility Studies.	1) Charles Harrell, Biman K. Ghosh, and Royce O. Bowden, Jr., 2003. Simulation Using Promodel, McGraw-Hill Higher Education, New York. 2) S. Christian Albright, Wayne L. Winston. 2015. Business Analysis Data Analysis and Decision Making, 5ed. Cengage Learning
10	DESIGN OF EXPERIMENT	Review of Basic Statistical Concepts. Single Factor Experiment (Fixed Effect Model). Single Factor Experiment (Random Effect Model). Randomized Complete Block Design. Latin Square Design. General Factor Design. 2k Factorial Design. Blocking in Factorial Design. Factorial Experiments with Random Factors. Fractional Factorial Design. Nested Design. Response Surface Model.	1) Douglas C. Montgomery. Design and Analysis of Experiments 7th Edition. 2009

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11	INDUSTRIAL STRATEGIC MANAGEMENT	<p>Understanding Industry Profitability. The Vertical Boundaries of The Firm. Strategic Positioning for Competitive Advantage. Leverging Market Power to Grow. Competitor and Competition. Competitive Intelligence. External Assessment. Internal Strategy Analysis &amp; Choice (IFE, EFE, IE, CPM, TOWS &amp; SPACE Matrices). BCG Matrix and GE/Mc Kinsey Matrix. Strategies in Action. Strategy Implementation. Strategy Evaluation and Control. Business Process Mapping. Balanced Score Cards. Total Performance Score Card.</p>	<p>1) Porter, M. 2008. The Five Competitive Forces That Shape Strategy. Harvard Business Review 2) Porter, M. 1998. Competitive Strategy: Techniques for Analyzing Industries and Competitors. Free Press.</p>
12	INFORMATION SYSTEM	<p>Overview. MIS As a Competitive Advantage. IT and Electronic Commerce. Enterprise Resource Planning (ERP). Database Management System. System Analysis and Design. Decision Support System. Executive Information System. Marketing, Manufacturing Information System. Financial, Human Resource Information System.</p>	<p>1) Raymond Mcleod, Jr. George P. Schell. Management Information System, 10th ed., 2007 Pearson Education 3) Thomas L. Saaty, Luis G. Vargas. University of Pittsburgh. Models, Methods, Concepts &amp; Application of the Analytical Hierarchy Process. Springer. 2001</p>

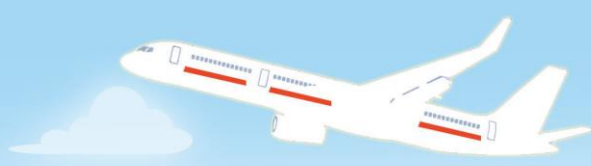
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13	INTRODUCTION TO ECONOMICS AND BUSINESS	Basic Concepts. Supply, Demand, and Market. Workforce, Land, and Assets. Trade and Tax. Economic Activities and National Income. Consumption and Investment. Money, Financial Market, and Moneter. Unemployment, Inflation, and Economic Policy. Growth and Development. The Purpose of Business. Business Plan. Start up. Business Operations. Capital. Marketing Principles. Financial Management. Resource Management. Service, Productivity, and Information.	<p>1) Mankiw, Gregory. Principles of Economics, 7th ed. USA: South-Western Cengage Learning. 2015</p> <p>2) Jones, Trevor. Business Economics and Managerial Decision Making. John Wiley&amp;Sons, Ltd. 2004</p>
14	LINEAR PROGRAMMING	Linear Programming Model and Graphical Solutions. Simplex Methods. Duality and Sensitivity Analysis. Transportation Models. Assignment Model. Integer Programming. Multi-Goal Mathematical Programming. Network.	<p>1) Hamdy A. Taha, Operations Research, 7th ed., Prentice-Hall, Inc. 2006</p> <p>2) Michele Conforti, Gerard Cornuejols, Giacomo Zambelli. 2014. Integer programming. Springer</p> <p>3) Dimitris Bertsimas, John N. Tsitsiklis. 1997. Introduction to Linear Optimization. Athena Scientific, Belmont, Massachusetts</p> <p>4) H. Paul Williams. 2013. Model Building in Mathematical Programming. Wiley</p>

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15	MAINTENANCE SYSTEM	Organizing for Maintenance Operations. Paperwork Control. Maintenance Job Planning and Scheduling. Maintenance Work Measurement and Standards. Preventive Maintenance Measuring and Appraising Maintenance Performance. Total Productive Maintenance. Cases of Maintenance Management.	1) B.S. Dhillon. 2002. Engineering Maintenance: A Modern Approach. CRC 2) Steven Borris. 2006. Total Productive Maintenance. McGraw-Hill
16	METHODS, STANDARD, AND WORK DESIGN	Introduction of Human Factors. Problem Solving Tools. Operation Analysis. Flow Process Chart. Anthropometry. Time Study. Performance Rating & Allowances. Work Sampling. Standard Data. Predetermined Time Study. Wage Payment.	1) Freivalds, A. 2009. Niebel's Methods, Standards, and Work Design, 12th ed. New York: McGRAW-HILL
17	MULTIVARIATE ANALYSIS	Review of Basic Statistical Concepts. Multiple Regression. Manova. Principal Component Analysis. Factor Analysis. Cluster Analysis. Discriminant Analysis. Logit Analysis. Canonical Correlation. Multidimensional Scaling. Structural Equation Modeling.	1) Joseph F. Hair, Jr.; William C. Black; Barry J. Babin; Rolph E. Anderson; Ronald L. Tatham. Multivariate Data Analysis 6th ed. Pearson Prentice Hall. 2006.

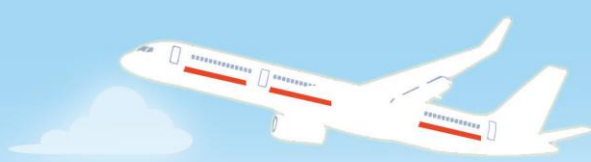
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18	OPERATIONAL RESEARCH	Dynamic Programming. Markov Analysis. Decision Tree. Game Theory. Non-Linear Programming. Queuing Theory. Optimization Simulation.	<p>1) Hamdy A. Taha, Operations Research, 7th ed., Prentice-Hall, Inc. 2006</p> <p>2) H. Paul Williams. 2013. Model Building in Mathematical Programming. Wiley</p> <p>3) John R. Birge, François Louveaux. 2011. Introduction to Stochastic Programming. Springer, Verlag New York</p> <p>4) Richard Bellman. 2010. Dynamic Programming. Princeton University Press</p> <p>5) Narayan Bhat. 2008. An Introduction to Queueing Theory: Modeling and Analysis in Applications. Springer</p>
19	ORGANIZATIONAL DESIGN	Basic Organizational Design, Adaptive Organizational Design, Managin Human Resources, Managing Career, Managing Teams.	1) Robbins, S. P. & Coulter, Mary. 2012. Management, 11th ed. USA : Pearson Education, Inc.

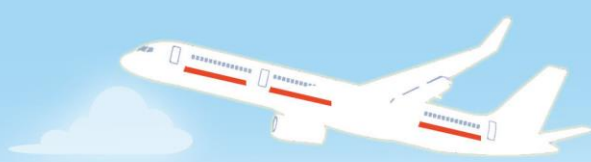
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20	PLANT LAYOUT	<p>Design Function. Design Procedure. Process Planning. Material Flow Planning. Analysis Technique. Relationship Planning Between Activities. Plant and Production Support Services. Space Calculations. Area Allocation. Material Handling Equipment. Plant Layout Development. Plant Location Considerations.</p>	<p>1) James MacGregor Apple. 1991. Plant Layout and Material Handling. Krieger. 2) David E. Mulcahy. 1999. Materials Handling Handbook. McGraw-Hill. 3) Alberto Garcia-Diaz, J. MacGregor Smith. 2013. Facilities Planning and Design. International Edition. Pearson.</p>
21	PRODUCT DESIGN	<p>Product Planning. Customer Needs Identification. Product Specification Development. Concept Development. Product Architecture. Design for Manufacturing. Design for Assembly. Prototype Building. Product Economy. Product Development Project Administration. Major Assignment Presentation.</p>	<p>1) Karl T. Ulrich and Steven D. Eppinger. 2007. Product Design and Development. 4th Ed. McGraw-Hill. 2) O. Molloy, S. Tilley, and E.A. Warman. 2012. Design for Manufacturing and Assembly: Concepts, architectures and implementation. Chapman &amp; Hall.</p>

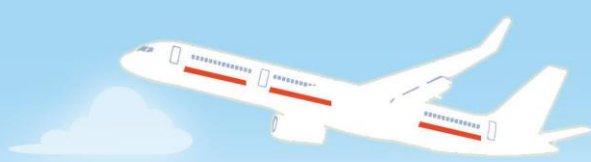
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22	PRODUCTION PLANNING AND CONTROL	Overview. Production Planning System. Master Requirement Planning (MRP). Material Requirement Plan. Capacity Planning. Inventory Control. Lot Sizing, Production Scheduling, Sequencing, and Evaluation. TOC/DBR Concepts.	<p>1) Arnold J. R. Tony and Chapman. 2012. Introduction to Materials Management. Prentice Hall</p> <p>2) Nahmias, S. 2000. Production and Operation Analysis, 4th Edition. McGraw-Hill and Irwin.</p> <p>3) Fogarty, et. Al. 1991. Production and Inventory Management, 2nd ed. Cincinnati, Ohio: South Western Publishing Co.</p> <p>4) Chapman, Stephen N. 2006. The Fundamentals of Production Planning and Control. Pearson-Prentice Hall</p>
23	PRODUCTION SYSTEM	Production Strategy. Product and Process Development. Location Analysis. Product and Process Layout Analysis. Capacity Analysis. Process Design, Analysis, and Performance. Distribution Planning. JIT/Lean Production System. Resource Planning, Scheduling, and Allocation. Lean Manufacturing.	<p>1) Chase, et. Al. 2014. Operations and Supply Chain Management. Irwin McGraw-Hill</p> <p>2) Sipper &amp; Buffin, Jr. 1997. Production Planning, Control, and Integrations. McGraw-Hill</p>
24	PROJECT MANAGEMENT	Definitions. System Theory. PMDA Project Organization. Staffing and Project Teams. Time Management. PERT. S-Curve Graphic. Cost Control.	<p>1) Gary R. Heerkens. 2002. Project Management. McGraw-Hill</p> <p>2) Erik W. Larson and Clifford F. Gray. 2011. Project Management: The Managerial Process Fifth Edition. McGraw-Hill.</p>

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25	QUALITY MANAGEMENT	3 Quality Pillars. Concepts, Methods, Tools, and Methods in Quality Management. Problem Solving with Quality Approach. 7 Steps of QI. 7 Tools. 7 New Tools. World Process Standards: ISO 9000, MBNQA, and Toyota Way Model. Six Sigma Methodology and Lean Six Sigma.	1) Thomas Pyzdek; Paul Keller. The Handbook for Quality Management 2nd edition. McGraw Hill. 2013 2) Michael L. George. Lean Six Sigma: Combining Six Sigma Quality with Lean Production Speed. McGraw Hill. 2002 3) Connie M. Borrer. The Certified Quality Engineer Handbook 3rd edition. ASQ Quality Press. 2009
26	STATISTICS AND PROBABILITY	Definitions, Functions, and Role of Statistics. Classification of Data. Probability Concept. Probability Distribution. Inferential Statistics. Sampling Technique and Distribution. Estimation. Hypothetical Testing. Chi-Square Distribution. F-Distribution and ANOVA. Regression and Simple Correlation. Multiple Regression. Non-Parametric Methods.	1) Ronald E. Walpole; Raymond H. Myers; Sharon L. Myers; Keying Ye. Probability & Statistics for Engineers & Scientists 8th edition. Pearson Prentice Hall. 2007. 2) Douglas C. Montgomery; George C. Runger. Applied Statistics and Probability for Engineers 3rd edition. John Wiley & Sons Inc. 2003
27	SYSTEM THINKING	Systems, Systemic, and Systematically. The 5th Discipline. Systems Dynamics Concepts. The Beer Game and Reflections. Mental Model. Soft System Methodology. Complexity Theory.	Michael C. Jackson. 2003. System Thinking Creative Holism for Manager. John Wiley & Sons Inc.

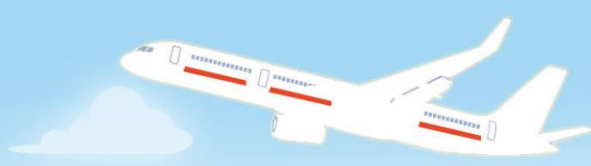
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28	SYSTEMS MODELING	Modeling and Simulation Development Methodology. Conceptual Model. Discrete Event Modeling. Continuous Event Modeling. Causal Loop Diagram. Stock and Flow Diagram.	<p>1) Suzanne Robertson &amp; James Robertson. 2006. Mastering the Requirement Process. 2ed. Addison Wesley Professional</p> <p>2) Ian Alexander and Neil Maiden. 2004. Scenarios, Stories and Use Cases: Through the Systems Development Life-Cycle. John Wiley &amp; Sons. 2004</p> <p>3) John D. Sterman. 2000. Business Dynamics: System Thinking and modeling for a ComplexWorld. McGraw-Hill, USA</p>
29	TECHNOLOGY MANAGEMENT	Overview of Management of Technology. Technology. Innovation. Strategy Process. Innovation. Internal Strategy. Obtaining Technology. External Strategy. Building Strategic MTI Success. Social Responsibility and Management Technology. Implementation. Control and Evaluation. Organizational Learning and Knowledge Management.	<p>1) Margaret A. White, Garry D., Bruton. The Management of Technology and Innovation. A Strategic Approach. 2nd Ed.,. 2007</p>

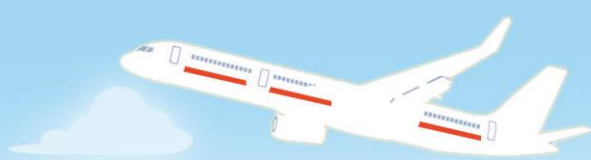
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30	TOTAL QUALITY MANAGEMENT	TQM Studies vs Principles. MBNQA. Statistical QC. Cost of Quality. QFD. Capability Process. Six Sigma. Taguchi. Change Management.	<p>1) Thomas Pyzdek dan Paul Keller. 2012. The Handbook for Quality Management, 2nd ed: A Complete Guide to Operational Excellence. McGraw-Hill Professional</p> <p>2) Peter S Pande et. Al. 2002. The Six Sigma Way Team Fieldbook. McGraw-Hill: New York.</p> <p>3) Hosotani, Katsuya. 1982. QC Problem Solving Approach: Solving Workplace Problems the Japanese Way. 3A Corporation, Tokyo.</p>
31	SUPPLY CHAIN MANAGEMENT	Strategic Fit and Scope of Supply Chain, Network Design, Demand Forecasting, Aggregate Planning, Transportation, Sourcing Decisions, Driver of Supply Chain Performance	<p>1) Chopra, Sunil. Supply chain Management : Strategy, Planning, and Operation. Prentice Hall International, Inc., New Jersey. 2004</p> <p>2) Christopher, M. Logistics &amp; supply chain management, 4th Ed., Pearson Education, 2011</p>

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32	BUSINESS PROCESS REENGINEERING	Business Modelling. Process Change. A Process Change Methodology. Redesign Business Process. The role of Information Technology in This Change. Modelling the Business Architecture. UML Primer. Business Patterns.	1) Varun Grover, William J. Kettinger. Business Process Change-Reengineering Concepts, Methods and Technologies. Idea Group. 1995 2) Hans-Erik Eriksson, Magnus Penker. Business Modelling With UML. Business Patterns at work 1st ed., 2000
33	MACRO ERGONOMICS	Introduction Macroergonomics, Macroergonomics Applications	to 1) Hendrick, Hal W. et al. 2002. Macroergonomics : Theory, Methods, and Applications (Human Factors and Ergonomics). Lawrence Erlbaum Associates.

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