SCHEME AND SYLLABI FOR

SEVENTH SEMESTER

OF

BACHELOR OF TECHNOLOGY IN

PRODUCTION ENGINEERING

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

7th Semester

Code	Subject	Hours/week			Marks		Sem- end duration-hours	Credits
		L	T	P/D	Inte-rnal	Sem-end		
PE09 701	Production Management	4	1	-	30	70	3	5
PE09 702	Operations Research-I	3	1	-	30	70	3	4
PE09 703	Maintenance Engineering & Management	2	1	-	30	70	3	3
PE09 704	Management Information Systems	2	1	-	30	70	3	3
PE09 Lxx	Elective II	3	1	-	30	70	3	4
PE09 Lxx	Elective III	3	1	-	30	70	3	4
PE09 707(P)	*Industrial Engineering Lab*	-	-	3	50	50	3	2
PE09 708(P)	*Metrology Lab*	-	-	3	50	50	3	2
PE09 709(P)	*Project*	-	-	1	100	-	-	1
	Total	**17**	**6**	**7**				**28**

PE09 701: Production Management

Teaching scheme **Credits:** 5

4 hours lecture and 1 hour tutorial per week

Objectives

- *To give an exposure to the different aspects of Production Management,viz., Production Planning and Control, materials Management and Quality management*

Module I (18 hours)
Production and Operations planning - _Production Systems - Forecasting of Demand- Variables – Opinion and Judgmental Methods - Time series methods – Regression & Correlation – Aggregate planning- Objectives - Aggregate planning Methods - Master Scheduling – Objectives – Methods of Master Scheduling

Module II (18 hours)
Material and Capacity requirements planning – MRP Concepts – MRP Logic – System refinements – Capacity management – Manufacturing resource planning (MRP II) – Scheduling and controlling of production activities – Objectives - Scheduling strategy and guidelines - methodology – priority control – capacity control - Scheduling for Job shop, Batch shop and high volume continuous systems- Concepts of ERP

Module III (18 hours)
Materials management- functions of purchasing and materials management – quality – inspection – sources of supply – pricing – inventory management – EOQ- models of replenishment – deterministic and probabilistic – P and Q systems of Inventory – Selective inventory management – ABC,VED,FSN,HML analysis of Inventory – Concept of JIT and zero inventory

Module IV (18 hours)
Plant layout and material handling – plant location - factors affecting selection – plant site - influence of location on plant lay out – location theory models – plant lay out – objectives of good plant layout – types of layout – methods showing flow.
Materials handling – principles of material handling – basic handling systems – handling systems to layout – integrated handlings – material handling equipments

Text Books

1. Joseph G Monks, *Operations Management, Theory and Problems*, McGraw-Hill International edition
2. Setharama, L Narasimhan etal.. *Production Planning and Inventory Control*, Prentice Hall India

Reference Books

1. S N Chary, *Production and Operations management*, Tata McGraw-Hill Publishing co. Ltd
2. Panneerselvam, *Production management*, Prentice Hall of India
3. N G Nair, *Production and operations Management*, Tata McGraw-Hill
4. Goplalakrishnan, *Materials Management*, McGraw-Hill publishers
5 Krajewsky, *Operations Management – Strategy*, Pearson education
6. Harold T Amrine, John A Ritchey, *Manufacturing Organization and Management*, Pearson Education
7. B Mahadevan, *Operations Management*, Pearson Education

Internal Continuous Assessment *(Maximum Marks 30)*

60
30

10

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 70

PE09 702: Operations Research

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To give a quantitative perspective to the decision making process*

Module I (14 hours)
History and development of O.R. – Linear programming – formulation – graphical solution – Simplex method – two phase method – dual and its solutions – sensitivity analysis

Module II (14 hours)
Transportation and assignment problems – formulation and solutions – tests for optimality – cases of degeneracy – Network techniques – net works : PERT / CPM – Critical path – crashing and resource levelling

Module III (13hours)
Queuing theory – types of queues - Poisson arrival exponential service – single server and multiple server queues
Introduction to simulation techniques – Monte Carlo simulation (No Problems)

Module IV (13 hours)
Decision theory: - Environments – decision making under certainty – decision making under risk, decision making under uncertainty – Game theory – two persons zero sum games – pure strategy and mixed strategy – Decision Tree.

Text Books

1. Kalavathy, *Operation Research,*Vikas Publications
2. N D Vohra, *Quantitative Techniques in Management*, Tata McGraw Hill

Reference Books

1. N.Ramanathan, *Operation Research,*Tata Mcgrawhill
2. P.C.Tulsian, *Quantitative Techniques*, Pearson Education
3. Taha.H.A., *Operations Research,* PHI
4. Anderson Sweeney Williams,*Quantitative Methods for Business*,Cengage learning

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

PE09 703: Maintenance Engg. & Management

Teaching scheme **Credits:** 3

2 hours lecture and 1 hour tutorial per week

Objectives

- *To expose the students how the deterioration of plant machinery equipment and other facilities are taking place*
- *To make them aware of various testing methods, preventive/corrective and timely actions to take including repair replacement etc*

Module I (9 hours)

Corrosion - harmful effects – electrochemical mechanism of corrosion - forms of corrosion - corrosion by special environments in industries such as chemical, petrochemical, iron and steel industry - corrosion prevention and control - material selection for corrosion environments - corrosion inhibitors - cathodic and anodic protection –corrosion testing and measurements

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Module II (9 hours)

Wear of machine parts - mechanism of wear - different types of wear - effect - factors influencing wear –wear measurements - bearing and lubrication – Types of bearings - bearing material and their requirements - lubricants - basic properties - additives - synthetic lubricants.

Module III (9 hours)

Scope and importance of maintenance - types of maintenance – corrective maintenance - preventive maintenance - concepts of total maintenance - terro technology - strategies and policies of organizing a preventive maintenance programme – monitoring techniques – vibration and noise monitoring analysis – vibration severity chart-shock pulse method-vibration signature analysis-ferrography-spectrometric oil analysis programme.

Module IV (9 hours)

Reliability - definition of reliability - product reliability - time depending relationship to quality assurance - measures of reliability - failure rate - failure distribution curves - MTBF - bath tub curve - reliability improvement - redundancy and its uses - maintainability and availability - safety and house keeping - replacement analysis - useful and economic life of equipment - reasons for replacement - factors affecting replacement decisions - economic analysis replacement criteria - group replacement – simple problems

TextBooks

1. Collacott, *Vibration Monitoring and Diagnosis - Technique for Cost Effective Plant Maintenance*, John Willey

Reference Books

1.Kenneth, Mc Brady M. & W. Kuer J., *Modern Maintenance Management*

2.Uhlig H.H., *Corrosion & Corrosion Control*, John Wiley Publishers

3.Neele M.J., *Tribology Handbook*, Butter Worths publications

4.Maj Gen Apthe S.S., *Plant Maintenance*, Delhi Productivity Council

5.Srinath, *Concept of Reliability*, Affiliated East West Publishers

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)* All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions* Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	*4 x 5 marks=20 marks*
PART C:	*Descriptive/Analytical/Problem solving questions* Two questions from each module with choice to answer one question.	*4 x 10 marks=40 marks*

Maximum Total Marks: 70

PE09 704: Management Information Systems

Teaching scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week

Objectives

- *To give an awareness of information sources, flow and it's processing for making correct decisions.*

Module I (9 hours)
Information systems-functions of management – levels of management- framework for information system- sequence of development of MIS- systems approach- systems concepts – systems and their environment- effects of system approach in information system design – using systems approach in problem solving- strategic use of information technology

Module II (9 hours)
A brief overview of computer hardware and software components- file and database management systems- communication system elements- introduction to network components-topologies and types- remote access- reasons for managers to implement networks- distributed systems- the internet and office communications.

Module III (9hours)
Application of information system to functional, tactical and strategic areas of management, decisions support systems and expert systems

Module IV (9 hours)
Information system planning- critical success factor- business system planning- ends/means analysis-organising the information systems plan- systems analysis and design- alternate application development approaches-organisation of data processing-security and ethical issues of information systems

TextBooks

1. Schultheis R. & Mary Sumner, *Management Information Systems-the Manager's View*, Tata McGraw Hill

Reference Books

1. Laudon K.C. & Laudon J.P., Management *Information Systems-organisation and Technology,* Prentice Hall of India
2. Sadagopan S., *Management Information Systems*, Wheeler Publishing
3. Alter S., *Information Systems: A Management Perspective*,Addison Wesley
4. Effy Oz.,*Management Information systems*, Thomson, Vikas Publishing House

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 70

PE09 707 (P): Industrial Engineering Lab

Teaching scheme **Credits:** 3

3 hours Practical per week

Objectives

- *To plan and conduct experiments to study and evaluate theoretical concepts in industrial engineering and quality control*
- *To train the students to plan experiments for evaluating practical situations*

1. Study and Experimentation on Central Limit Theorem_- for different population distributions, Triangular Distribution, Rectangular Distribution and Normal Distribution
2. Factorial Experimentation - Analysis of variance and test of Significance on different process/product parameters._
3. Motion Study – Preparation of Flow process chats, outline process charts flow diagram and multiple activity charts, two handed process charts, for industrial operations.
4. Application of Principles of Motion economy – determination of time savings by improving work methods
5. Time Study – Determination of standard time of an operation by stopwatch method.
6. Plant layout and material handling – Layout planning and optimization of material handling using techniques of string diagram travel charting etc.
7. Variable control charts – Plotting and interpretation of variable control charts for X and R and Process capability determination.
8. Attribute Control charts – Plotting and interpretation of attribute control charts P-Charts and C- Charts
9. Acceptance sampling by attributes – Plotting and interpretation of Operating Characteristic curves, determination of AQL, LTPD, Risks and AOQL
10. Measurement of effect of Work on Human Body – Using ECG, BP Monitor, Tread Mill etc and ergonomical design.
11. Measurement and analysis of productive Skills - Direct and indirect eye hand co ordination measurement using co ordination testers
12. Measurement and analysis of dexterity, speed, skill, visual sensation and tactile sensation abilities – Using coin sorters and match board equipments
13. Measurement and analysis of human visual fields, depth perception – using Depth perception tester and Perimeter.

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

Semester End Examination *(Maximum Marks-50)*

70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

PE09 708(P): Metrology Lab

Teaching scheme **Credits:** 3

3 hours practical per week

Objectives

- *To provide information of how actual measurements are conducted and also about the selection of measuring instruments for different purposes*

1. Testing of gears
2. Determination of cutting forces on tool bits - lathe, drilling machine, milling machine and grinding machine
3. Measurement of tool signature – single point tools using tool makers microscope
4. Measurement of surface roughness
5. Use of comparators - mechanical, optical, electrical & pneumatic
6. Determination of cutting tool temperature using thermocouples
7. Use of profile projectors
8. Acceptance Test of machine tools - lathe, shaper, milling and grinding machines
9. Measurement of straightness and flatness
10. Measurement of vibrations
11. Measurement of area
12. Measurement of sound
13. Measurement of speed

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

Semester End Examination *(Maximum Marks-50)*

70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

PE09 709(P): Project

Teaching scheme **Credits:** 1
1 hour per week

- The project work should enable the student to take up an engineering problem. Analyse it and suggest solutions. The student can take up an industrial problem or can work in house.
- He is expected to be under an academic guide and an industrial guide depending on whether the project is in house or in an industry.
- The student is expected to undertake a project in the areas like design, maintenance, manufacturing, management etc after due consultation with academic guide and industrial guide as per the situation.
- During the 7^{th} semester he is expected to finalise the project topic and do the necessary literature survey. He shall submit a report of the work done at the end of the semester. Based on this internal evaluation will be done.