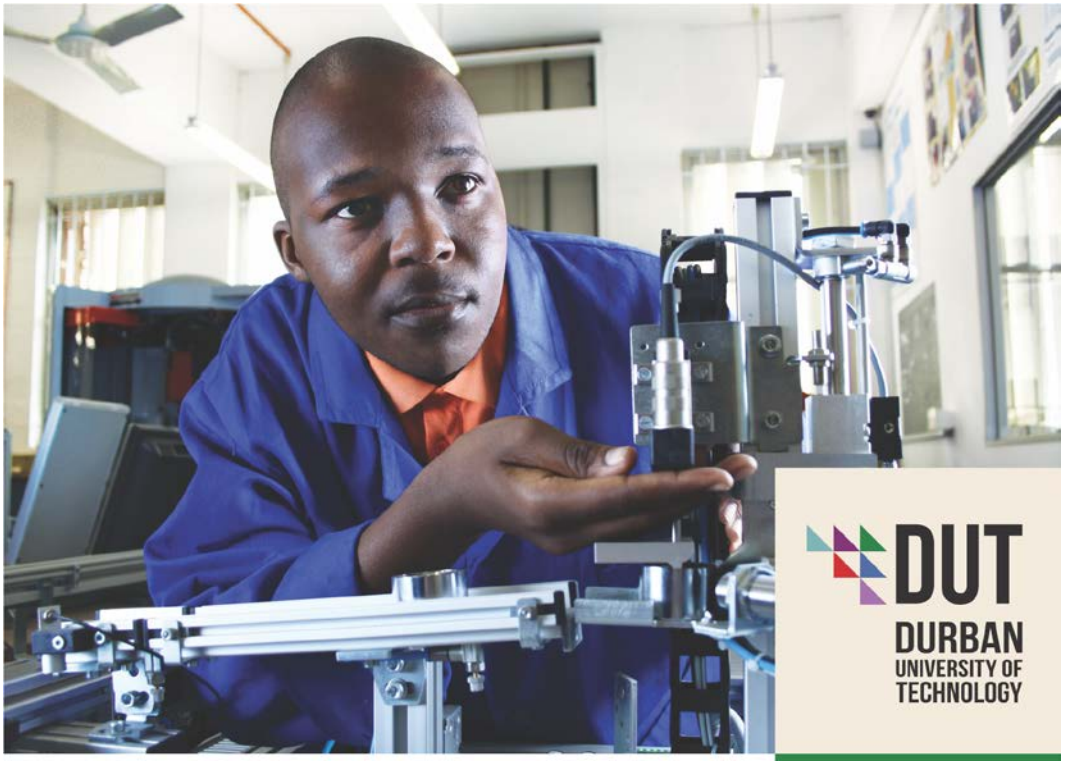

DUT
DURBAN
UNIVERSITY OF
TECHNOLOGY

2016 HANDBOOK
INDUSTRIAL ENGINEERING

FACULTY OF
ENGINEERING
& THE BUILT
ENVIRONMENT

HANDBOOK FOR 2016

FACULTY OF ENGINEERING AND THE BUIILT ENVIRONMENT

DEPARTMENT of
INDUSTRIAL ENGINEERING

Programmes:

N.Dip. ENGINEERING: INDUSTRIAL
B.Tech. ENGINEERING: INDUSTRIAL
Master of ENGINEERING
Doctor of ENGINEERING

CONTENTS

Location: Steve Biko Campus
S4 Level 0
Telephone: 031-373 2445
Fax: 031-373 2014
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IMPORTANT NOTICE

The Departmental rules in this handbook must be read in conjunction with the Durban University of Technology's General Rules

NOTE TO ALL REGISTERED STUDENTS

Your registration is in accordance with all current rules of the Institution. If, for whatever reason, you do not register consecutively for every year/semester of your programme, your existing registration contract with the Institution will cease. Your re-registration anytime thereafter will be at the discretion of the Institution and, if permitted, will be in accordance with the rules applicable at that time.

STAFF

Head of Department:	Mr A K Naicker, (Pr Tech Eng), B Tech: Industrial Eng (MLST); MBA (UKZN) MSAIIE
Senior Lecturer:	Mr R Singh, (Pr Tech Eng); M Tech: Industrial Eng (DUT); MSAIIE
Lecturers:	Mr C Lourens, B Tech: Industrial Eng (MLST); MSAIIE
	Mr U Pancha, B Tech: Industrial Eng (MLST); MSAIIE
	Mrs H Jackson, B Tech: Industrial Eng (MLST); MEng (DUT); MSAIIE
	Mr M Dewa, (Pr Eng); B. Eng: Industrial Eng (NUST); MSc. MSOM (UZ), MSAIIE
Secretary:	Mrs K Dhavraj
Technician:	Mr M Herelall, National Diploma: Mechanical Engineering

IE1 GENERAL INFORMATION

Modern Industrial Engineering is concerned with the integration of resources and processes into cohesive strategies, structures and systems for the effective and efficient production of quality goods and services in any undertaking.

Industrial Engineering draws upon specialized knowledge and skills in the mathematical, physical, behavioural, economic and management sciences, and fuses with the principles and methods of engineering analysis and design, to find optimal and practical solutions. They contribute to the success and prosperity of an industrial undertaking, thereby making a fundamental contribution to the creation of wealth.

What is a University of Technology

The objective of a University of Technology such as DUT is "to create, apply and transfer knowledge and technology of an international standard through cooperative and professional career education programmes."

What do Industrial Engineers do?

The planning, design, re-design and implementation of processes that would encompass all aspects of the business

To be able to combine technical with specialised management to improve the business in such a manner that would ensure sustainable growth and prosperity

There is a great need for the knowledge and skills of Industrial Engineers in the South African Economy. The Department of Industrial Engineering strives to fill this need by providing quality education to our students.

Vision

To be a strategic partner that communicates progressive knowledge of organized human activity and socio-technical systems.

Mission

Our mission is to:-

Strengthen partnership with relevant stakeholders

Provide innovative teaching and learning practices

Develop research capacity in Industrial Engineering

Purpose Statement

National Diploma (N. Dip) [SAQA NO. 72229] obtaining this qualification will be competent in applying Operations Management techniques and strategies resulting in effectiveness and productivity in industry. The diplomat will be able to register with the Engineering Council of South Africa (ECSA) as a candidate engineering technician.

Bachelor of Technology (B. Tech) [SAQA NO. 72130] achieving this qualification will be competent in the leading of programs regarding productivity improvement, integrated manufacturing systems, operating information systems, and those of project and logistics management. The graduates will be able to register with the Engineering Council of South Africa (ECSA) as a candidate engineering technologist.

Master of Engineering (MEng) [SAQA NO. 96827]

This qualification is intended for persons who will make a contribution, through research, to understanding the application and evaluation of existing knowledge in a specialized area of technology. They will also demonstrate a high level of overall knowledge in that area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

(Amended w.e.f. 2015/08)

Doctor of Engineering (DEng) [SAQA NO. 96812]

This qualification is intended for persons who will make a significant and original contribution to knowledge in a specialised area of technology. They will have a high level of overall knowledge in that specialised area ranging from fundamental concepts to advanced theoretical or applied knowledge.

(Amended w.e.f. 2015/08)

IE2 ENTRANCE REQUIREMENTS FOR NATIONAL DIPLOMA: ENGINEERING: INDUSTRIAL (SAQA no. 72229)

In addition to the relevant General Rules pertaining to Registration (e.g. Rules G3, G4, G5, G6, G7, G8, G9 & G10); persons must, as a minimum, have obtained the following Senior Certificate, or equivalent subject results:

Maths & Science (E) on Higher Grade, or (C) on Standard Grade and a pass in English. In addition a learner must obtain a minimum of a total score of 35 when using the following scoring system for Senior Certificate subject results in order to be accepted into the programme.

Scoring system: Using the table below determine the scores associated with each Senior Certificate subject result obtained, multiply the mathematics and science scores by two and add all the scores together to obtain a total.

Symbol	A	B	C	D	E	F
Higher Grade	8	7	6	5	4	3
Standard Grade	6	5	4	3	2	1

Thereafter selection is made at the full discretion of the Head of the Industrial

Engineering Department, based on the senior certificate or equivalent results and the number of students, which the department can accommodate. An interview may also be required.

For students who matriculate with the NSC Rating:

In addition to the relevant General Rules pertaining to Registration (e.g. Rules G3 to G10); learners must, as a minimum, have obtained the following NSC, or equivalent subject results:

	Result
Mathematics	4 (Adequate achievement)
Science	4 (Adequate achievement)
English (Home Language)	4 (Adequate achievement)
English (First Language)	4 (Adequate achievement)

In addition, a learner must obtain a minimum of a total score of 28 when using the following scoring system for NSC subject results in order to be conditionally accepted into the programme.

Scoring system: using the following table, determine the scores associated with each NSC subject result obtained, multiply the mathematics and science scores by two and add all the scores together to obtain a total.

Note: It is compulsory for all students to have either completed the Maths Paper 3 (Geometry) module at school or to have registered it during their first semester in addition to Maths I.

NSC Rating Code	7	6	5	4	3	2	1
Score	7	6	5	4	3	2	1

A student having an N4 with passes of 50% or higher in four (4) subjects, two of which must be Mathematics and Mechanotechnics, plus a pass at senior certificate level in English and one other language, will be accepted provided there is sufficient space.

For Students who matriculate with the NCV Level 4 Rating:

A student must have a 60% pass in all of the following subjects:-

- English
- Maths
- Life Orientation
- Physical Science or equivalent
- and two other vocational subjects

Thereafter, selection is made at the full discretion of the Head of Department based on a number of factors including class size, equity etc.

IE3 ENTRANCE REQUIREMENTS FOR B.TECH: ENGINEERING: INDUSTRIAL [SAQA NO. 72130]

Eligible applicants are required to have graduated with a National Diploma: Engineering: Industrial with Maths III as one of the exit level subjects.

Prospective students with other engineering diplomas who have completed additional industrial engineering specific coursework plus experience in the field of Industrial Engineering may apply for recognition of prior learning. (Refer to rule G10)

(Amended w.e.f. 2014/01)

IE4 ENTRANCE REQUIREMENTS FOR MASTER of ENGINEERING [SAQA NO. 96827]

Students are required to have completed a degree (M+4) in Industrial Engineering. Graduates with an M+4 engineering degree in any discipline within the engineering profession plus related experience in the field of Industrial Engineering can apply for the qualification using rule G10 – Conferment of Status.

(Amended w.e.f. 2015/08)

IE5 ENTRANCE REQUIREMENTS FOR DOCTOR of ENGINEERING [SAQA NO. 96812]

Students are required to have completed a Masters degree in Industrial Engineering. Graduates with a (M+4) degree in Industrial Engineering plus an appropriate Masters degree relevant to the field of Industrial Engineering can apply for the qualification using rule G10 – Conferment of Status.

(Amended w.e.f. 2015/08)

IE6 ASSESSMENT

In addition to the Rule Book for Students the following specific rules apply to all subjects:-

(1) The method of evaluation and compilation of the semester/progress mark in all subjects is indicated in the learner guide for the subject.

(2) A student who for any reason is absent from a particular practical or test, must provide proof of his/her reason for absence to the particular lecturer concerned immediately on his/her return to class and be prepared to sit for a make-up test or practical as determined by the particular staff member. Refusal to accept this will result in a zero mark for the particular test or practical.

(3) Supplementary examinations are offered by this department; refer to rule G13 for eligibility for writing supplementary exams.

IE7 PROMOTION

In addition to rule G16 no student shall be allowed to register for a higher level unless they meet the following criteria:

(1) The student must have completed all Semester 1 subjects in order to register for any Semester 3 subjects.

(2) The student must have completed all Semester 1 and Semester 2 subjects in order to register for any Semester 4 subjects.

(3) The student must have completed all academic coursework prior to being allowed to register for Industrial Engineering Practice P1 and P2.

(Amended w.e.f. 2015/08)

IE8 LATE REGISTRATION

(1) No student will be permitted to register for any programme offered by the Department later than one week after the commencement of lectures, provided that the student has obtained written permission from the Department to attend lectures and has been doing so since the commencement of lectures.

(2) No student will be permitted to add or delete subjects later than one week after the commencement of lectures.

IE11 RULES FOR QUALIFICATIONS NATIONAL DIPLOMA: ENGINEERING: INDUSTRIAL [SAQA NO. 72229]

The programme comprises a minimum of two (2) credits formal time and one (1) credit non-formal or experiential time. The Programme must include at least 0,5 credits of formal time at level 3. All subjects for the NDip: Engineering: Industrial are compulsory.

Subject Code	Subject Description
Semester 1	
COSK101	Communication Skills 1
CPSK101	Computer Skills 1
MATH101	Mathematics 1
MCHN101	Mechanics 1
MCHD101	Mechanical Eng. Drawing 1
MMFE101	Mechanical Manufacturing Eng 1
ETEC101	Electrotechnology 1
Semester 2	
CADN102	Computer Aided Draughting 1
EWOR103	Engineering Work Study 1
MATH201	Mathematics 2
MMFE201	Mechanical Manufacturing Engineering 2
PEIN102	Production Engineering 1
QTES101	Qualitative Techniques 1

Semester 3

COST201	Costing 2
EWOR203	Engineering Work Study 2
FLYH201	Facilities Layout & Material Handling 2
MATH301	Mathematics 3
MREL201	Manufacturing Relations 2
PEIN202	Production Engineering 2

Semester 4

AUMA301	Automation 3
EWOR302	Engineering Work Study 3
ILEA301	Industrial Leadership 3
INDA303	Industrial Accounting 3
OPRS303	Operational Research 3
QASS201	Quality Assurance 2

Semester 5

EXEI101	Industrial Engineering Practice 1

Semester 6

EXEI201	Industrial Engineering Practice 2

IE10 LECTURE CLASHES

1) No student will be permitted to register for any subject combination where there will be any timetable clashes in the case where all subjects are first time registrations.
2) In the case where a student is repeating subjects the student will be allowed a maximum of one period clash per repeated registered subject.

   It is the responsibility of the student to check, prior to registration, their timetable for potential clashes.

IE11 SUPPLEMENTARY EXAMINATIONS

1) Supplementary examination-General Rule G13 (2) applies.
2) Special examination-General Rule G13 (3) applies.

IE12 BACHELOR OF TECHNOLOGY: ENGINEERING: INDUSTRIAL [SAQA NO. 72130]

The programme comprises a minimum of one (1) credit formal time. The student can choose to undertake 2 subjects or 4 subjects per semester.

All subjects for the B.Tech: Engineering: Industrial are compulsory.

Semester 1

ENTR401	Entrepreneurship 4
INSY401	Information Systems 4
PJEN401	Project Engineering 4
PTEH401	Production Technology 4

Semester 2

LENG401	Logistics Engineering 4
PJRE401	Project Research 4
QASS401	Quality Assurance 4
SDYS402	Systems Dynamics 4

IE13 PRE-REQUISITE SUBJECTS:

(Where there is no lower level in the particular subject)

Subject	**Pre-requisite**
Computer Aided Draughting	Mechanical Engineering Drawing
Qualitative Techniques 1	Mathematics 1
Engineering Work Study 2	Qualitative Techniques 1
Quality Assurance 2	Qualitative Techniques 1
Automation 3	Mechanical Manufacturing; Engineering 2
Industrial Accounting 3	Costing 2
Industrial Leadership 3	Manufacturing Relations 2
Manufacturing Relations 2	Communication Skills 1
Operational Research 3	Production Engineering 2

IE14 COMPULSORY SUBJECTS/CREDITS

All subjects for Industrial Engineering are compulsory.

IE15 WORK INTEGRATED LEARNING

(1) This programme requires the student/candidate to undergo a period of work integrated learning as part of the course. All prescribed compulsory and elective subjects and the prescribed experiential component must be passed in order to obtain sufficient credits to qualify for the qualification.

(2) Although the Durban University of Technology undertakes to assist the student/candidate in obtaining suitable work integrated learning placement, the onus is on the student/candidate to find placement. The employer must be accredited by the University for the purposes of work integrated learning. A work integrated learning agreement creates a separate contract between the "employer" and the student/candidate.

(3) Students must register at the department for the subject Industrial Engineering Practice as soon as they secured employment as the work integrated learning will only be recognized from the date of registration. Students are advised to contact the Department of Co-Operative Education to enquire about job opportunities.

(4) The student must maintain a portfolio outlining the experience gained through the work integrated learning component for each level.

(5) Outlined below is the procedure that would be followed by the department, regarding WIL

(i) Student must register for their WIL Modules (P1 or P2), within one

month after commencing their training. When registering the student must complete an EL 2 form, obtainable from the department, and must ensure that the form is return to the department completed with all the necessary details pertaining to their training.

(ii) The student is required to furnish proof of employment from the company where he/she is doing their training. If the student has enrolled into a learnership or a specialized training program offered by the company or a SETA accredited institution, the student needs to verify that the content being taught or experience gathered is in line with the field of Industrial Engineering. It is preferable that the student contacts the department prior to enrolling into such a program.

(iii) It is recommended that the student submit a draft project report, completed in accordance to the guidelines given by the department, within three months from the date of commencement for their training.

(iv) The first draft of the final training portfolio (hardcopy) must be submitted by the student 2 (two) weeks before the end of their training period.

(v) The student must ensure that they receive correspondence from the department confirming receipt of the portfolio.

(vi) The portfolio would then be assessed according to the assessment criteria, outlined by the department, and the student would be informed of the necessary corrections that would be required (if any). This process would take 3 (three) weeks to complete. If longer then the student will be informed by the department as to when they could expect feedback on their portfolios.

(vii) The student has a period of 2 (two) weeks thereafter to complete the necessary changes and to re-submit the final portfolio. The student is also required to submit the draft copy where the changes and/or recommendations were made by the department as well.

(viii) Thereafter the portfolio would be re-assessed by the department and the student duly informed.

(ix) If there is to be any deviation from the above process and timelines, documented evidence in the form of written correspondence, must be submitted to the HOD for approval.

(x) If the student defaults in keeping to the above procedure without written consent from the department, they would be required to re-register that part of their training module (P1 & P2).

(xi) All students registering for experiential learning must complete their experiential learning P1 & P2 within a two year period from the date of registration of P1. Should the student fail to comply with this requirement he/she is required to re-register experiential training.(P1 & P2)

Once a student has completed all the subjects and work integrated learning components, the student must apply for graduation.

The diploma will be awarded only on successful completion of all the subjects and the work integrated learning component.

IE16 Master of Engineering [SAQA NO. 96827]

This is a research-based qualification requiring advanced studies on behalf of the student in any subject/s related to the specific field of study. Students are required to undertake research under the guidance of a supervisor.

MEng. studies may be undertaken on a part-time or full-time basis.
(Amended w.e.f. 2015/08)

IE17 Doctor of Engineering [SAQA NO. 96812]

This is a research based qualification requiring advanced studies on behalf of the student in any subject/s related to the specific field of study. Students are required to undertake research under the guidance of a supervisor.

DEng. studies may be undertaken on a part-time or full-time basis
(Amended w.e.f. 2015/08)

IE18 N4 EQUIVALENTS

A student can apply for credits for the following subjects provided that they have passed the N-subjects with 50% or higher.

DUT Subject	FET Exemption
Communication skills 1	Communication N4 & N5
Computer skills 1	Computer practice N4 & N5
Mechanical Engineering Drawing 1	Mechanical Draughting N4 with a pass of 60% or more.
Mathematics 1	Mathematics N4 & N5
Mechanics 1	Mechanotechnics N5 and Engineering Science N4
Mechanics of Machines 2	Mechano Technics N5 & N6
Mathematics 2	Mathematics N5 & N6
Strength of Materials 2	Strength of Materials N5 & N6
Mechanical Engineering Design 2	Mechanical Drawing and Design N5 & N6
Electrotechnology 1 *(Amended w.e.f. 2014/01)*	Electrotechnics N4 & N5 & N6
Mechanical Manufacturing Engineering 1	The student must show proof of at least 18 months appropriate practical trade-oriented experience.

IE19 PHASE OUT RULES FOR THE NATIONAL DIPLOMA: ENGINEERING: INDUSTRIAL [SAQA NO. 72229]

The dates stated in this rule are subject to change depending on the effective approval date for the new HEQF aligned programmes.

Important information for current and prospective students (effective as of January 2016):

The current National Diploma: Engineering: Industrial will be phased out starting in 2016 to allow for the introduction of the new Bachelor of Engineering Technology in Industrial Engineering.

The last cohort of first-time entering students admitted to this National Diploma qualification will be in January 2016.

Notwithstanding all the current rules (both General rules and Departmental rules) that regulate this diploma, the last semester in which any student may register for each of the subjects is listed as follows:

Subject Name	Last Possible Semester of Registration
Communication Skills I	July 2016
Computer Skills I	July 2016
Mathematics I	July 2016
Mechanics I	July 2016
Mechanical Eng. Drawing I	July 2016
Mechanical Manufacturing Engineering I	July 2016
Electro-technology I	July 2016
Computer Aided Draughting	July 2017
Engineering Workstudy I	July 2017
Mathematics 2	July 2017
Mechanical Manufacturing Engineering 2	July 2017
Production Engineering I	July 2017
Qualitative Techniques I	July 2017
Costing II	July 2018
Engineering Workstudy 2	July 2018
Facilities Layout & Material Handling 2	July 2018
Mathematics 3	July 2018
Manufacturing Relations 2	July 2018
Production Engineering 2	July 2018
Automation 3	July 2019
Engineering Workstudy 3	July 2019
Industrial Leadership 3	July 2019
Industrial Accounting 3	July 2019
Operations Research 3	July 2019
Quality Assurance 2	July 2019
Experiential Learning I (P1)	January 2020
Experiential Learning II (P2)	July 2020

(W.e.f. 2015/08)

IE20 SYLLABUS

All the subjects offered by the Department of Industrial Engineering are semester courses.

NOTE: The curriculum reflected in all the courses below is an indicative guideline. Changes may have occurred through periodic subject review.

AUTOMATION III

1. INTRODUCTION

1.1. Why automate
1.2. Cost of automation
1.3. Automation strategies
1.4. Where to automate

2. DIFFERENT LEVELS OF AUTOMATION

2.1. How to automate
2.2. Automation of one workstation using pneumatics and PLC's
2.3. Presswork as a method to save labour and material
2.4. Jigs and fixtures employed as a toll to improve quality and labour savings
2.5. CNC applications from parts programming to flexible machining centers
2.6. Automation of a production line. Automatic transfer of parts, feeding and sorting of parts with mechanical, pneumatic and electronic means.
2.7. Auto sizing of parts during and after manufacture.

COMMUNICATION SKILLS I

1. Communication theory
2. Oral presentations
3. Technical writing skills
4. Group communication skills

COMPUTER AIDED DRAUGHTING I

1. Introduction to Inventor
2. Directory and file handling
3. Exploring the Inventor commands
4. Orthographic machine drawing
5. Drawing Graphics for WordPerfect
6. Isometric Drawings
7. 3 Dimensional Drawings
8. Plotting and Printing

COMPUTER SKILLS

1. General Introduction to Computers.
2. Basic Keyboard Skills.
3. Word Processing.
4. Spreadsheets.
5. Email and Internet
6. Preparation of CV's.

COSTING II

1. Introduction to Cost & Management Accounting
2. Classification of costs
3. Material and inventory control
4. Labour costs
5. Classification and analysis of overheads
6. Cost/volume and Profit Anaysis
7. Basic job costing systems
8. Budgets
9. Standard costing systems

ELECTROTECHNOLOGY I

1. The fundamental laws
2. Circuit elements
3. Simple dissipative circuits
4. Analysis of dissipative circuits
5. Magnetic circuits
6. Inductance
7. Capacitance
8. Response of RL and RC circuits

ENTREPRENEURSHIP IV

1. Introduction to strategies management
2. Strategic Management Model for business
3. Situation Analysis of a business
4. Strategy formulation, implementation and control
5. Continuous improvement approaches
6. Case studies and projects

ENGINEERING WORK STUDY I

1. Introduction to Work Study
2. Choice of method study Techniques
3. Method Study (Standard level)
4. Jigs and fixture
5. Work measurement (Time Study)
6. Working conditions and environment

ENGINEERING WORKSTUDY II

1. Problem solving & creative thinking
2. Choice of method study techniques
3. Method study techniques [High level]
4. Work measurement [High level]
5. Ergonomics
6. Value analysis
7. Performance index of production factors [Low Level]
8. Incentive schemes
9. Work study in the administrative function

ENGINEERING WORK STUDY III

1. Introduction to systems thinking using simul8
2. Concepts in simulation with simul8
3. Developing a similation model
4. Design Project, group project using the F1 concept

FACILITY LAYOUT AND MATERIAL HANDLING II

1. Fundamentals of facilities planning and design
2. Product design and process planning: scrap estimates, flow patterns
3. Layout procedures: product layout, process layout, fixed position layout and cellular layout
4. Material handling principles, equipment and system design
5. Storage and warehouse systems
6. Office and personnel planning

INDUSTRIAL ACCOUNTING III

1. The role and environment of finance
2. Financial statements and analysis
3. Cash Flow and Financial planning
4. Time Value of money
5. Capital budgeting cash flows
6. Capital budgeting techniques
7. Working capital and current assets management
8. Computer applications

INDUSTRIAL LEADERSHIP III

1. Introduction of management
   Character, Levels, Functions, Management and productivity. Management and operations, Management and styles
2. Project planning
   Purchasing, installation and utilization of new equipment, techniques and procedures (Concept, Forecasting, Objective setting, Programming and scheduling, Budgeting and costing, Procedure development)
3. Organising
   Organising a team: reasons and advantages, organization structure, delegation and job design
4. Leading
   Exercise team leadership: Concept, Management styles, Decision making, Communication, Motivation, Personnel selection, Personnel development
5. Control
   Control on progress, finances and personnel: Concept, Performance standards, Performance measurement, Performance rating, Corrective action
6. Case studies

INFORMATION SYSTEMS IV

1. Structure and strategies organizational role
2. Computer systems resources
3. Decision support systems and executive information systems
4. Development and implementation of information systems

LOGISTICS ENGINEERING IV

1. Introduction to logistics
2. Measure of logistics
3. System Operational Requirements
4. Logistics in System Design
5. System Operation and Support
6. Logistic support management
7. Projects

MANUFACTURING RELATIONS II

1. Personnel and The Personnel Function
2. Human relations
3. Labour relations

MATHEMATICS I

1. Determinants, Logarithms, Formulae, Trigonometry (Radian measure)
2. Complex Numbers (Forms + ; - ; x ; roots)
3. Statistics (Descriptive, Central Tendency and Dispersion)
4. Calculus (Differentiation and Elementary Integration)

MATHEMATICS II

1. Differentiation and applications
2. Integration and applications
3. 1st order differential equations and applications
4. Matrices

MATHEMATICS III

1. The solution of ODE by:

1.1. D-operators
1.2. Laplace transforms
1.3. Numerical technique

2. Eigen values and eigenvectors
3. Fourier series:

3.1. Analytical
3.2. Numerical

MECHANICAL ENGINEERING DRAWING I

Section 1. Use of instruments, line work, printing and dimensioning.
Freehand sketching.
Tangency of lines and curves.
Development
Section 2. Pictorial drawing.
Section 3. Orthographic Engineering Drawing.
Section 4: Sectional Drawings
Section 5: Assembly Drawings

NB: Sectional and Assembly Drawings are required in the first and thrid angle projection of various shaped blocks, castings and industrial apparatus.

MECHANICAL MANUFACTURING ENGINEERING I

1. Occupational Health and Safety
2. Introduction and Overview of manufacturing
3. Sheet Metal Working
4. Theory of Metal Machining
5. Machining operations and machine tools
6. Fundamentals of Welding
7. Welding processes

MECHANICAL MANUFACTURING ENGINEERING II

1. Fault diagnosis, failure analysis and advanced measuring equipment
2. Test methods, interpretation and action
3. Powder metallurgy
4. Metal forming
5. Erosion
6. Castings
7. Plastics and machining
8. Welding & joining
9. Obtaining finish and accuracy

MECHANICS I

1. Statics
2. Dynamics

OPERATIONS RESEARCH III

1. Introduction to quantitative Analysis
2. Fundamentals of decision theory models & decision trees
3. Linear programming models (graphical & simplex)
4. Transportation & assignment models
5. Integer programming
6. Waiting lines & queuing theory
7. Simulation modeling
8. Markov analysis

PRODUCTION ENGINEERING I

1. Introduction
2. Competitiveness, strategy and productivity
3. Forecasting techniques
4. Product and service design, reliability
5. Capacity planning and location planning
6. Facilities Layout
7. Learning curves
8. Quality Management

PRODUCTION ENGINEERING II

1. Supply chain management
2. Inventory Management
3. Aggregate planning
4. Materials requirements planning
5. Just-in-time systems

6. Maintenance
7. Scheduling
8. Theory of Constraints
9. Project Management

PRODUCTION TECHNOLOGY IV

1. Computer Aided Process Planning
2. Automation of Flow lines
3. Automated Assembly Systems
4. Automated Inspection and Testing
5. Automatic Identification Systems
6. Flexible Manufacturing Systems
7. Enterprise Integration and Computer Integrated Manufacturing
8. Projects and Computer Applications

PROJECT ENGINEERING IV

1. Need and advantages of project management
2. Definition of the project
3. Modern project planning methods
4. Communication and presentation of information
5. Feasibility studies [Economic justification]
6. Project Implementation
7. Support of the operational systems
8. Case studies, projects and computer applications

PROJECT RESEARCH IV

1. Problem Identification
2. Choice and use of measuring instruments
3. Literature studying
4. Experimental Design
5. Analysis and interpretation of data
6. Composition of the project report
7. Case studies and projects

QUALITATIVE TECHNIQUES I

1. Introduction
2. Descriptive Techniques
3. Probability and Probability Distributions
4. Sample selection and sampling theory
5. Operational sample design
6. Hypothesis testing
7. Regression analysis
8. Decision theory and Bayesian probability
9. Using the Computer

QUALITY ASSURANCE II

1. Introduction
2. Different philosophies
3. Quality improvement techniques
4. Quality control techniques

5. Product acceptance
6. Acceptance sampling
7. Measurement
8. Reliability
9. Quality assurance
10. Computer applications

QUALITY ASSURANCE IV

1. Introduction: Quality Assurance in perspective
2. Philosophies of Crosby, Deming, Juran, etc.
3. Advanced Quality techniques
4. Quality Audit (SABS 0157/ISO 9000)
5. Total Quality management
6. Case study and projects

SYSTEMS DYNAMICS IV

1. Introduction to simulation and systems modelling
2. Simulation and flow charting of algorithms
3. Probability and Statistics used in simulation
4. Steps in building a simulation model
5. Simulation Modelling using Simul8
6. Introduction to Systems Thinking

(Amended w.e.f. 2014/07)