

# HANDBOOK FOR 2014

## FACULTY of ENGINEERING AND THE BUILT ENVIRONMENT

DEPARTMENT of  
INDUSTRIAL ENGINEERING

Programmes:

N.Dip. ENGINEERING: INDUSTRIAL  
B.Tech. ENGINEERING: INDUSTRIAL  
M.Tech. ENGINEERING: INDUSTRIAL  
D.Tech. ENGINEERING: INDUSTRIAL

# CONTENTS

	Page
Staff.....	1
Industry Support.....	1
General Information.....	1
Rules for the Department.....	3
Rules for Qualifications.....	7
Syllabi in Alphabetical Order.....	13

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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
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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] —Graduates obtaining this qualification will be competent in applying Operations Management techniques and strategies resulting in effectiveness and productivity in industry. The qualified person will be able to register with ECSA.

Bachelor of Technology (B.Tech) [SAQA NO. 72130] —Graduates 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 ECSA.

Master of Technology (M.Tech) [SAQA NO. 72178] —This qualification is intended to allow graduates to apply integrated operations techniques, together with advanced analysis and problem solving, to a particular specialisation in the field of Industrial Engineering/Operations Management, through involvement in an applied research project.

Doctor of Technology (D.Tech) [SAQA NO. 72100] —This qualification is intended to allow graduates to increase the width and depth of knowledge in Industrial Engineering and Operations Management through involvement in an original research project.

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]

Students are required to have completed a National Diploma: Engineering: Industrial.

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

### IE4 ENTRANCE REQUIREMENTS FOR M.TECH ENGINEERING: INDUSTRIAL [SAQA NO. 72178]

Students are required to have completed a degree (M+4) in Industrial Engineering.

Prospective students with other engineering degrees plus experience in the field of Industrial Engineering can apply for recognition of prior learning. (Refer to rule G10)

### IE5 ENTRANCE REQUIREMENTS FOR D.TECH ENGINEERING: INDUSTRIAL [SAQA NO. 72100]

Students are required to have completed a Masters degree in Industrial Engineering.

Prospective students with other Masters qualifications in engineering plus experience in the field of Industrial Engineering can apply for recognition of prior learning. (Refer to rule G10)

## 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 Semester 1, Semester 2 and Semester 3 subjects in order to register for Industrial Engineering Practice 1 and 2.
- (4) No student will be allowed to re-register at the DUT for the National Diploma: Industrial Engineering unless he/she passes the minimum number of four (4) subjects per semester of registration.

Note: In S1, Communication and Computer Skills is registered as one subject credit.

NB: All the above rules can be waived at the discretion of the HOD

## IE8 EXCLUSION

A student shall be excluded from this department due to unsatisfactory academic progress (Refer to rule G17 in the Rule Book for Students).

Also note the following:

- (1) In the case of continuous assessment subjects, only two registrations are permitted, except where valid documented proof of illness is accepted by the Head of Department.
- (2) The above exclusions will apply until the student can show proof of successfully completing the subject(s) at any other recognized institution.

- (3) In the case of a student excluded under rule G17 and the exclusion being waived, the student must re-register for the subject(s) that resulted in the exclusion, in the same semester that the waiver has been granted.

## IE9 REGISTRATION

- (1) Students registering for the National Diploma: Engineering: Industrial, must register for the maximum number of subjects available to them, according to IE11, for the level in which they are registering. If a student is registering for subjects on different levels the student must register for all available subjects on the lowest level first and may then add additional subjects on the higher levels.
- (2) 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.
- (3) In the case where a student is repeating subjects the student will be allowed a maximum of one period clash per subject registered.
- (4) It is the responsibility of the student to check, prior to registration, their timetable for potential clashes as the department reserves the right to de-register students from subjects registered in contravention 1 & 2

## IE10 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

#### IE12 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 as the department reserves the right to deregister students from subjects registered in contravention of (1).

#### IE13 SUPPLEMENTARY EXAMINATIONS

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

#### IE14 REFUSAL OF RE-REGISTRATION

- 1) A learner who has not successfully completed any subject after two periods of registration shall only be permitted to re-register for that subject at the discretion of the Head of Department. (A subject for which a learner de-registers after the last day of the first term in either semester shall count as a period of registration).
- 2) A learner who has been refused permission to re-register for a subject in terms of Rule (1), and thereby will be unable to complete the qualification will not be permitted to register for any other subject in that qualification.
- 3) No student will be allowed to re-register at the DUT for the National Diploma: Industrial Engineering unless he/she passes the minimum number of four (4) subjects per semester of registration.  
Note: In S1 Communication and Computer Skills is registered as one subject credit.
- 4) A learner who has not completed the diploma within six years of first registering, may at the discretion of the Head of Department be refused permission to re-register, or may be accepted subject to special conditions.
- 5) A learner wishing to appeal to the Faculty of Engineering against the application of this Rule must submit to the Faculty Officer a statement in which the learner explains the reasons for his/her appeal.

- 6) This appeal must be submitted to the Faculty Officer within ten (10) days of being officially notified in writing that the learner has not been permitted to register. No appeals will be considered after this.

IE15 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

IE16 CO-REQUISITE SUBJECTS:

A student cannot register for any of the following two subjects without simultaneously registering for QTES101 - Qualitative Techniques 1:

EWOR103	Engineering Work Study 1
PEIN102	Production Engineering 1

Alternatively the student must have passed QTES101 - Qualitative Techniques 1 in a previous semester.

IE17 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

## IE18 PROMOTION TO A HIGHER LEVEL [G21]

No student is permitted to register for a higher level in a subject before having passed the lower level in that subject or the lower level pre-requisite subjects

## IE19 COMPULSORY SUBJECTS/CREDITS

All subjects for Industrial Engineering are compulsory.

## IE20 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 if approved, the student would be 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 completed all the subjects and work integrated learning components, the student must apply for graduation.

Diploma shall be awarded only on successful completion of all the subjects and the work integrated learning component.

## IE21 M.TECH ENGINEERING: INDUSTRIAL [SAQA NO. 72178]

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.

An M. Tech may be undertaken on a part-time or full-time basis.

IE22 D.TECH ENGINEERING: INDUSTRIAL [SAQA NO. 72100]

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.

A D.Tech may be undertaken on a part-time or full-time basis.

IE23 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

Electrotechnics N4 & N5

Mechanical Manufacturing

The student must show proof of

Engineering 1

at least 18 months appropriate practical trade-oriented experience.

## IE24 SYLLABUS

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

NOTE: SUBJECT TO CHANGE UPON REVIEW OF COURSE CURRICULUM

### 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 Analysis
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 simulation 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 —Concept 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 third 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. Fundamentals of modeling
2. System definition and model formulation
3. Model validation and analysis
4. Interpretation of simulation model
5. Animation of simulation model
6. Additional discrete modeling concepts
7. Advanced manufacturing features
8. Projects and computer applications