

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

SYLLABUS FOR 2nd Sem MTech PROGRAMME

Statistical Process Control (03208154)

Type of Course: MTech

Prerequisite: Knowledge of Statistics and Mathematics.

Rationale: Statistical Process Control is the essential for analyses of data in field of engineering. Statistical Process Control course provides tools and techniques of solving quality control problems for various fields of Engineering.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
Lect	Tut	Lab		External		Internal			
				T	P	T	CE	P	
2	1	0	3	60	30	20	20	20	150

Lect - Lecture, Tut - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Fundamentals of Statistics: Probability, Descriptive Statistics, Probability distributions, Inferential Statistics, statistical aids in limits and tolerances.	11%	3
2	Introduction to SPC: Definition of SPC and Quality Control, meaning of Quality Improvement, Describing variation, pattern of variation, Chance and Assignable Causes of variation, Statistical Basis of the Control Chart, The "Magnificent Seven", Implementing SPC, An Application of SPC, Recent research and development in SPC.	11%	3
3	Control Charts for Variables: Introduction, X-bar and R charts, X-bar and S charts, The Shewhart Control Chart for Individual Measurements, drawing conclusions, revising control limits, interpretation of lack of control Applications of Variables Control Charts, use of computer software.	22%	7
4	Control Charts for Attributes: Control chart for fraction Non-conforming P-chart, np-chart, c-chart and u-chart. Demerit systems, CUSUM chart, EWMA Chart, choice between attribute and variable control chart, SPC for short production runs, Guidelines for Implementing Control Charts.	22%	7
5	Process Capability Analysis: Introduction, Specification Limits and Control Limits, Natural Tolerance Limits Specifications and Process Capability, Techniques for process capability analysis, Process Capability Indices, Inferential properties of process capability ratios, Process Capability Analysis Procedures.	17%	5

6	Acceptance Sampling for Attributes and Variables: Fundamental concepts in acceptance sampling, Advantages and Disadvantages of sampling, Operating Characteristic Curve, Producer and Consumer Risks, Lot by Lot Acceptance sampling plans, single, double and multiple sampling plans, LTPD, AOQL, AOQ, Recent developments in inspection methods.	17%	5
---	---	-----	---

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Fundamentals of Quality Control and Improvement
AmitavaMitra; 3rd Edition,Prentice Hall
2. Statistical Quality Control
Grant and Leavenworth; Tata McGraw Hill; " 7th Edition
3. Statistical Quality Control
M. Mahajan; DhanpatRai& Co.
4. Applied Statistical Quality control and Improvement
K. Krishnaiah; Eastern Economy Edition
5. Statistical Quality Control
D C Montgomery; John Wiley & sons; INC, 7th Edition 2012
6. Introduction to statistical Quality control
Douglas C Montgomery, John Wiley & Sons
7. Statistical Process Control Paperback
John S Oakland; Import,2007.
8. Elementary Statistical Quality Control
John T. Burr; CRC Press; 2nd Edition

Course Outcome:

After Learning the course the students shall be able to:

1. Introduce the various aspects of Statistical Process Control to engineering problems.
2. Present the Statistical Process Control as a numerical method for engineering.
3. Present Conventional Approach to analyze and optimise experimental data.
4. Analyze different control charts for variables and attributes with examples.
5. Explain Lot-by-Lot Acceptance Sampling for Attributes Acceptance Sampling Problem.

List of Tutorial:

1. Study of X bar and R chart using statistical software.
2. Case Study on CUSUM Chart.
3. Case Study on Implementation of Control Chart.
4. Study on 7 QC Tools.
5. Case Study on Process Capability.

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

SYLLABUS FOR 2nd Sem MTech PROGRAMME

Industrial Management (03208180)

Type of Course: MTech

Prerequisite: Zeal to learn the subject.

Rationale: Industrial Management is the language of communication for Engineers and Managers. Industrial Management course provides a link between engineering and management.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
Lect	Tut	Lab		External		Internal			
				T	P	T	CE	P	
2	1	0	3	60	30	20	20	20	150

Lect - Lecture, **Tut** - Tutorial, **Lab** - Lab, **T** - Theory, **P** - Practical, **CE** - CE, **T** - Theory, **P** - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	INTRODUCTION TO INDUSTRIAL MANAGEMENT: Management and Industrial Engineering and relation with other fields, Management concepts, characteristics of management, functions of management - Planning, Organizing, Staffing, Directing, Co-ordination, Controlling, Motivating, Communication, Decision Making. Levels of management, managerial skills, managerial roles, Forms of Organization- Line , Line –staff etc.	10%	3
2	PLANT LOCATION AND LAYOUT: General considerations, Types of Layout, Cellular Manufacturing, Layout Analysis Techniques (CORELAP, ALDEP, CRAFT). WORK ANALYSIS AND MEASUREMENT: Design of work methods, Time and motion study, Work sampling.	20%	6
3	QUALITY MANAGEMENT: Definition of quality, types of quality – quality of design, conformance and performance, phases of quality management, Juran's and Deming's view of quality Quality Management Assistance Tools: Ishikawa diagram, Pareto Analysis, Poka Yoke (Mistake Proofing), quality circles, TQM, Kaizen, Five S (5S), Six sigma, Acceptance Sampling, Control Charts. Quality Management Standards (Introductory aspects only): The ISO 9001:2000 Quality Management System Standard- The ISO 14001:2004 Environmental Management System Standard- ISO 27001:2005 Information Security management System.	25%	9

4	MATERIAL MANAGEMENT: Inventory management, Deterministic and probabilistic models of Inventory control, Material requirements Planning, JIT, ERP, Business process reengineering.	15%	4
5	PROJECT MANAGEMENT: Project Management, Project network analysis, CPM, PERT and Project crashing and resource Leveling. MANAGEMENT INFORMATION SYSTEM: Concept of data and information, characteristics of information, types of information, Definition of MIS, Need, Purpose and Objectives, Contemporary Approaches to MIS, Components of an information system, Need to study information systems, Classification of information systems, Functional Business systems – sales & marketing, Human resources, accounting, manufacturing etc. Decision-making models, Types of decisions, Decision Support Systems.	15%	4
6	SUPPLY CHAIN MANAGEMENT: Introduction to Supply Chain Management (SCM): Concept of Logistics Management, Concept of supply chain management and CRM, Core competency, Value chain, Elements of supply chain efficiency, Flow in supply chains, Key issues in supply chain management, Bullwhip effect, Sourcing and Procurement	15%	4

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Introduction to Work study
ILO; Geneva
2. Motion and Time Study – Design and Measurement of Work
Barnes, Raeph.m.; John Wiley &sons.
3. Statistical Quality Control
E.L. Trant, and Leavensworth; Mcgraw Hill
4. Fundamentals of Quality Control and Improvement
AmitavaMitra, Wiley
5. Supply chain Management: Strategy, Planning and Operations
Chopra, S., and Meindl, P.; Pearson Education (Singapore) Pte. Ltd

Course Outcome:

After Learning the course the students shall be able to:

1. Relate the Industrial Engineering and Management
2. Learn Various Management Techniques.
3. Make Decision in Real World by Using Various Decision Making Techniques.
4. Recognize the need of Advanced Management Techniques.

List of Tutorial:

1. To study Modern Computerized layout design techniques.
2. To understand applications of 7 QC tools in service and manufacturing firm.
3. Improvement measure in manufacturing and service sector through Six sigma. – A case study.
4. To study various pillars of TQM.
5. A review on Modern material management strategies.
6. To study world class best practices on Supply chain management.

7. Numerical analysis on various control charts.

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

SYLLABUS FOR 2nd Sem MTech PROGRAMME

Manufacturing Automation (03208181)

Type of Course: MTech

Prerequisite: Zeal to learn the subject.

Rationale: Manufacturing Automation course provides a link between engineering and automation techniques. Manufacturing Automation in general enables the effective and economical operation of both production equipment and processes.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
Lect	Tut	Lab		External		Internal			
				T	P	T	CE	P	
2	1	0	3	60	30	20	20	20	150

Lect - Lecture, **Tut** - Tutorial, **Lab** - Lab, **T** - Theory, **P** - Practical, **CE** - CE, **T** - Theory, **P** - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	INTRODUCTION TO AUTOMATION Automation production system, Mechanization and automation, Types of automation, Automation strategies, Mechanical, electrical, hydraulic and Pneumatic automation devices and controls, Economics of automation.	10%	3
2	AUTOMATION AND COMPUTER INTEGRATED MANUFACTURING (CIM): Computers in Industrial manufacturing, Product cycle & Production development cycle, Introduction of CAD/CAM & CIM, sequential and concurrent engineering, Computerized Manufacturing planning systems, shop floor control & automatic identification techniques. Computer Network for manufacturing and the future automated factor.	10%	3
3	COMPUTER AIDED QUALITY CONTROL (CAQC): The computer in Q.C, automated inspection principles and methods, Contact inspection methods, non-contact inspection methods, machine vision system, optical inspection method, sensors, coordinate measuring machine, Computer Aided testing, Integration of CAQC with CAD/CAM, Features of Computer controlled machine tools, NC, DNC, CNC, VNC, automatic tool changers, group technology, cell design and layout, Computer aided process planning (CAPP).	25%	8

4	<p>FLEXIBLE MANUFACTURING SYSTEMS (FMS):</p> <p>Major elements of FMS and their functioning:</p> <p>i. Tool handling system.</p> <p>ii. Material handling system.</p> <p>iii. Automated guided vehicles (AGV).</p> <p>iv. Automated storage and retrieval system (AS/RS).</p> <p>FMS layout - concept, types and applications:</p> <p>i. Data required developing an FMS layout.</p> <p>ii Signal flow diagram and line balancing in FMS.</p> <p>iii FMS layout illustrations.</p>	25%	8
5	<p>HIGH VOLUME MANUFACTURING AUTOMATION</p> <p>Classification and type of automatic transfer machines; Automation in part handling and feeding, Analysis of automated flow lines, design of single model, multimodel and mixed model production lines.</p> <p>ASSEMBLY AUTOMATION:</p> <p>Assembly systems, Automatic transfer, feeding and orienting devices, Flexible assembly systems, Performance evaluation and economics of assembly systems.</p>	15%	4
6	<p>INTRODUCTION TO ROBOTICS:</p> <p>Robots-concept, definition, benefits and various areas of application in Manufacturing systems, Terminology used in robotics.Robots-types, physical configuration, classification and selection criterion, Axes nomenclature, Types and uses of Manipulators & Grippers.Sensors-types, classifications, working principle and applications of, position, force & torque, proximity, vision, velocity & acceleration sensors.</p>	15%	4

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. CAD/CAM
Zimmers& Grover; PHI.
2. CAD/CAM/CIM
P. Radhakrishna; New Age International.
3. Automation, Production Systems & Computer Aided manufacturing
M. P. Grover; Prentice Hall.
4. Production Systems and Computer Integrated Manufacturing
GROOVER M P; Automation, Prentice Hall India (P) Ltd, 1989.
5. Industrial Automation and Robotics
A.K Gupta, S.K. Arora; LaxmiPubilaction (P) Ltd
6. Principles of Automation & Automated Production Process
Malov and Ivanov; Mir Publication.
7. Automation in Production Engineering
Oates and Georgy Newness

Course Outcome:

After Learning the course the students shall be able to:

1. Understand the importance of product development through CIM. Get knowledge of shop floor control, Computer Integrated Manufacturing and Automation.
2. Adopt appropriate material handling and storage in an automated manufacturing environment.
3. Incorporate methods of utilization of appropriate features in CAD application enhancing productivity in design.
4. Get a clear idea of importance of an FMS system in present manufacturing world.
5. Select appropriate type of FMS layout, material handling and retrieval systems for the given case.

List of Tutorial:

1. Study of CNC Machine available in laboratory
2. Case study on Robot application
3. Case study on FMS Layout
4. Introduction to Robots & its application
5. Case study on CAQC
6. Study of various machines used for CAQC

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

SYLLABUS FOR 2nd Sem MTech PROGRAMME

IPR & Product Design (03208182)

Type of Course: MTech

Prerequisite: Awareness about Product Design, IPR and Patent

Rationale: The course aims at providing the basic concepts of product design, product features and its Architecture so that student can have a basic knowledge in the common features a product has and how to incorporate them suitably in product. Also how to protect the design rights.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
Lect	Tut	Lab		External		Internal			
				T	P	T	CE	P	
2	1	0	3	60	30	20	20	20	150

Lect - Lecture, Tut - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Introduction: Significance of product design, product design and development process, sequential engineering design method, the challenges of product development. Significance of product design, product design and development process, sequential engineering design method, the challenges of product development.	10%	3
2	Concept Generation and Product Planning: Activities of concept generation, clarifying problem, search both internally and externally, explore the output. Product planning steps and its implementation. Introduction to various software used for concept generation.	15%	4
3	Identifying Customer Needs & Product specifications: Interpret raw data in terms of customers need, organize needs in hierarchy and establish the relative importance of needs. Establish target specifications, setting final specifications.	15%	4
4	Industrial Design: Assessing need for industrial design, industrial design process, management, assessing quality of industrial design.	10%	3
5	Intellectual Property: Overview and Introduction to IP. IPR in India & abroad. Introduction to Copy rights, Trade marks and its procedure. Licensing and IPR acts. Case study of IPR.	25%	8

6	Patents: Introduction and overview. Procedure to file a patent: Prior art search, Patent drafting, claim drafting and filing a patent. Use of various search engines to perform prior art search. Case study of Patent drafting.	25%	8
---	--	-----	---

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Product Design and Development
Ulrich K. T, and Eppinger S.D.; Tata McGraw Hill
2. Product Design
Otto K, and Wood K; Pearson
3. Engineering of creativity: introduction to TRIZ methodology of inventive Problem Solving
Semyon D. Savransky; CRC Press
4. Inventive thinking through TRIZ: a practical guide
Michael A. Orloff; Springer
5. Systematic innovation: an introduction to TRIZ ; (theory of inventive Problem Solving),
By John Terninko, Alla Zusman; CRC Press
6. Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets (English) 3rd
Edition Paperback;
E Bouchoux, Deborah; Cengage Learning India Pvt Ltd, New Delhi
7. Intellectual Property Rights : Basic Concepts (English) 01 Edition Paperback
m.m.s. karki; Atlantic

Course Outcome:

After Learning the course the students shall be able to:

1. Understand the integration of customer requirements in product design
2. Apply structural approach to concept generation, selection and testing
3. Understand various aspects of design such as industrial design , design for manufacture, economic analysis and product architecture.
4. Understand various aspects of design such as industrial design , design for manufacture, economic analysis and product architecture Able to perform prior art search for patent application and draft patent.

List of Tutorial:

1. Case study on Product design.
2. Case study to understand the customer needs and its relation to product development.
3. Case study on IPR
4. Use of search engines to find various patents for the given case.
5. Case study on Patent drafting

M.Tech Seminar Guidelines of PARUL UNIVERSITY



(2015-16)

M.Tech.(Name of the course)

Guidelines for Seminar:

SEMESTER- II											
Code	Subject	Teaching Scheme (Hrs/Week)			Cr	Examination Scheme					Total
		L	T	P		External		Internal			
						Th	Pr	Th	*C.E.	Pr	
03200151	SEMINAR	0	2	0	2	-	-	-	50	-	50

*C.E = 50 marks =Average of 50 marks (for 1st seminar) and 50 marks (for 2nd seminar)

1. Each student has to present two seminars as per following details.
2. 1st seminar will be on the topic of student's choice where in compilation of information from various reference books or latest technology apart from syllabus shall be encouraged. The topic of this seminar should be based on fundamentals/theory of student's broad area of dissertation. Presentation should be of minimum half an hour.
3. 2nd seminar will be on research paper selected from reputed journal with known impact factor. Student should select the paper also from their broad area of dissertation.
4. Selection of title and paper for the seminars shall be done by student in consultation with the concern seminar supervisor.
5. Schedule will be declared by the department.
6. Students have to submit report and soft copy of ppt for the seminars.
7. Guidelines for the Department and Supervisors:
 - 7.1 Department has to depute supervisors to the students for seminar. As the students will select the topics of both the seminars as per the selection of their broad area of dissertation, allocate same supervisor for seminar and dissertation.
 - 7.2 For the continuous evaluation of the seminar, total 50 marks are divided into two parts.
 - (a) 50 marks for the 1st seminar and (b) 50 marks for the 2nd seminar.
 Final 50 marks will be the average of above mentioned two seminars of 50 marks.
 - 7.3 Presentations of the seminar should be taken in presence of supervisor, at least two faculty members with expertise in the area of seminar being presented and all the students of that class.
 - 7.4 For marking consider the technical knowledge, oral and ppt presentation skills and analysis done by the student based on the information he/she has gathered.
8. **Seminar Evaluation:** Follow the following evaluation sheet for the marking of seminar.

Sample Format for evaluation:

PARUL UNIVERSITY, FACULTY OF ENGINEERING AND TECHNOLOGY

-----Department

M.Tech (Name of Program)

Mark sheet for Seminar (03200151)

Semester 2 (Batch: [admission year i.e. 2015])

Date of Exam:

Sr. No.	Enrollment Number	Name of the student	Report (10 marks)	Technical Skill (20 marks)	Presentation (10 marks)	Question-Answer (10 marks)	Total (50 marks)

Guidelines for writing the seminar report

1	Paper and size:	A4 size
2	Cover:	Spiral bind, Please refer annexure I for the format.
3	Total number of pages:	Minimum 15 to 20 (including references and other annexure)
4	Page margins:	Top and bottom margins should be 24.5 mm (i.e 1"=24.5mm), right margin should be 20 mm, and the left margin should be 35 mm for both textual and non textual (figures, tables, etc) pages. The header footer should be 10 mm each.
5	Line spacing:	double line/1.5
6	Font:	1) Main Heading :-16 font size(Times New Roman , Bold) 2) Sub Heading :-14 font size(Times New Roman , Bold, Italic) 3) Details after sub heading :-12 font size(Times New Roman)

7	Front Covers	<p>The front covers shall contain the following details:</p> <p>#Full title of seminar in 6 mm 22 point's size font properly centered and positioned at the top.</p> <p>#Full name of the candidate in 4.5 mm 15 point's size font properly centered at the middle of the page.</p> <p>#Replica of the Institute symbol followed by the name of department, name of the Institute, each in a separate line and properly centered and located at the bottom of page.</p>
8	Paragraph:	<p>The first line of each paragraph should normally be indented by five characters or 12mm. A candidate may, however, choose not to indent if he/she has provided sufficient paragraph separation.</p>
9	Chapter format	<p>Each chapter shall begin on a fresh page (odd number page in case of double sided printing) with an additional top margin of about 1". Chapter number and title shall be printed at the center of the line in 6mm font size (18pt) in bold face using both upper and lower case (all capitals or small capitals shall not be used). A vertical gap of about 25mm shall be left between the Chapter number and Chapter title lines and between chapter title line and the first paragraph.</p>
10	Sections and Subsections	<p>A chapter can be divided into Sections, Subsections and Sub subsections so as to present different concepts separately. Sections and subsections can be numbered using decimal points, e.g. 2.2 for the second section in Chapter 2 and 2.3.4 for the fourth Subsection in third Section of Chapter 2. Chapters, Sections and Subsections shall be included in the contents with page numbers flushed to the right. Further subsections need not be numbered or included in the contents. The Section and Subsections titles along with their numbers in 5 and 4mm (14 pt) fonts, respectively, in bold face shall be flushed to the left with 15 mm space above and below these lines. In further subdivisions character size of 12 pt with bold face, small caps and italics may be used for the titles flushed left. These shall not feature in the contents.</p>
11	Table / Figure Format:	<p>As far as possible tables and figures should be presented in portrait style. Small size table and figures (less than half of writing area of a page) should be incorporated within the text, while larger ones may be presented on separate pages. Table and figures shall be numbered chapter wise. For example, the fourth figure in chapter 5 will bear the number Figure 5.4 or Fig 5.4</p>

		Table number and title will be placed above the table while the figure number and caption will be located below the figure. Reference for Table and Figures reproduced from elsewhere shall be cited in the table and figure caption, e.g. [12].
12	Page Numbering:	In footer with right aligned Numerals, Pagination for pages before the Introduction chapter shall be in lower case Roman numerals, e.g., “iv” and for other pages write number as “1”.
13	Footer:	Footer should include “M.Tech Seminar report, Parul University”
14	References:	All references must be cited in the text by the reference number using superscripts. No links between superscripts in the text and actual references in the Reference Sections may be used.

Organization of the seminar report:

1. Page 1 should contain the title of the dissertation on the top of the page with Bold font, name of the candidate, department, institution and the university to which affiliated. (Annexure I)

2. Certificate: certificate should contain the following. (Please refer the annexure II)

- a. Name of the candidate
- b. Enrollment number
- c. Semester
- d. Branch of study
- e. Institution where the work was carried out
- f. Title of seminar
- g. Name of the HOD

3. Table of contents: This should contain the names of sections and page numbers against them.

Cover Page	i
Certificate	ii
Abstract	iii
Acknowledgement	iv
Table of Contents	v
List of Figures	vii
Chapter 1: Introduction	1
Chapter 2: Methodology: Materials and Methods	3
Chapter 3: Observations, results and Discussion (for 2nd seminar)	
Chapter 4: Conclusions & Summary	
Chapter 5: References	

4. Observations and Results:

The findings of the study should be analyzed and should be arranged in tables, charts and diagrams. The photographs of observations taken during the course of study should also be included. The text in this chapter should explain the observations table wise.

5. Discussion:

- a. Analyze data and relate them to other studies.
- b. Possible explanations for any variation in the results
- c. Significance of results in terms of hypothesis and their practical implications
- d. Evaluate strengths and weaknesses of work
- e. Recommendations for further work

The findings of the study should be analyzed along with the already known information about the topic studied. The limitations of the study and recommendations of areas for further study in future can also be discussed.

6. Conclusions & Summary

Conclusions derived from the logical analysis presented in the Results and Discussions Chapter shall be presented and clearly enumerated, each point stated separately. Scope for future work should be stated lucidly in the last part of the chapter.

7. References

References cited should follow the style given below:

PAPERS

1. Thiel WJ and Nguyen LT, "Fluidized bed film coating of an ordered powder mixture to produce micro encapsulated ordered units." *J. Pharm. Pharmacol.* **1984**, 36, 145-152.
2. Isyumov N, "Criteria for acceptance of wind induced motions of tall buildings", International Conference on Tall buildings, Rio DeJanerio, CTBUH, 2003.

WEB SITE

3. Boggs, D, "Acceleration and Drift due to Gust forces", July 2009, www.cppwind.com/papers/structural/PEAKvsRMS.pdf

BOOKS

4. PelzarMJ., Chan ECS., and Krieg NR. In Microbiology; 5th Edn; Tata McGraw Hill Publishing Company Limited, New Delhi, 1993, pp 536.

DISSERTATIONS

5. Vaishnav D.K, PhD Thesis, “.....”, _____ University, July 2012.
6. Pathak VK. Ph.D. Thesis, “.....”, _____ University, 1979.

PATENTS

7. Trevor M, Aggelos N and Helmut S.Process for the preparation of aceclofenac. European Patents EP 1082290 A1, 1999.

Seminar report on
[Seminar Title]

(6 blank lines)

By
(4 lines)

Your name as found in official Parul records, i.e Patel Harsh A.
Enrollment Number: xxxxxxxxxx

(three lines)

Supervised by
[Supervisor's name
Name of the Department
Name of the Institut

(6 blank lines)

A seminar report submitted to
Parul University
[Name of Program]
(3 blank lines)

Semester 2



**Name of the Department,
Name of the Institute,
Parul University,
P.O.Limda, Ta.Waghodia - 391760
Dist. Vadodara, Gujarat(India)
Phone : +91-2668-260312/202/300/307
Email : admissions@paruluniversity.ac.in,parultrust@paruluniversity.ac.in**



**Name of the Institute,
Name of Department,
Parul University,
Limda, Waghodia, Vadodara**

CERTIFICATE

*This is to certify that the Seminar Report entitled
" _____ (in bold) _____"
is prepared and presented by **xxx** bearing Enrollment **No.: xxxxxxxxxx** in 2nd
Semester of **M.Tech (Name of Program)** and his work is satisfactory.*

Date: 24/10/2013

xxxxxxx

Seminar Supervisor,
Name of the Department
Name of the Institute

xxxxxxx

Head Of Department,
Name of the Department,
Name of the Institute

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

SYLLABUS FOR 2nd Sem MTech PROGRAMME

Theory of Metal Forming (03208151)

Type of Course: MTech

Prerequisite: Understand metal forming concept

Rationale: This course provides the knowledge and practice regarding different metal forming processes and its applications. It gives idea about the different software aspects of these processes.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Basics of Elasticity and Plasticity:: Plasticity –True stress strain diagrams in simple tension – Deviation from Engineering stress – Strain curves. Three dimensional stress system, Mohr's Circle, Strain tensor and Yield Criteria of metals, principle of normality, incremental plastic strain.	10%	5
2	Fundamentals of Metal Forming:: Classification of forming processes – Cold working – Recovery Recrystallization and grain growth, hot working. Constitutive Relationships, Mechanical properties, Work hardening, Strain rate effects–work of plastic deformation, plane strain compression test, bulge test, plastic instability in tension test.	20%	6
3	Flow Stress Curves:: Super plasticity in materials – Slab Analysis for Sheet Drawing –Slip line field theory and its solution-Hot working and cold working operation – Relative merits and applications.	15%	5
4	Forging:: Open die and closed die forging, machine forging, upset forging etc., forging loads, forging die design. Estimation of forging loads for rectangular and cylindrical slugs. Forgability Tests. Defects in forging, Forging equipment – constructional features and operation.	15%	6
5	Rolling:: Principles of rolling, Process parameters, Mechanics of Rolling, Estimation of rolling loads by consideration of stresses. Principles of roll pass design for various product shapes. Principles of ring rolling. Processing maps and their applications in metal working operation. Rolling mills – Their constructional features and operation.	10%	5

6	Extrusion:: Classification of extrusion processes, extrusion equipment. Hot extrusion. Deformation and defects in extrusion. Analysis of the extrusion process, cold extrusion. Extrusion of tubing and production of seamless pipe and tubing. Upper bound and Lower bound Solutions for Extrusion. Drawing of rods, wires and tubes: Rod and wire drawing, tube drawing process, residual stresses in rod, wire and tubes.	20%	10
7	Software aspects:: CAD/CAM applications in Extrusion, Forging and sheet metal Forming.	10%	10

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Metal Forming Mechanics and Metallurgy
Hosford W.F and Caddell, R.M; Prentice Hall
2. Theory of Plasticity
Narayanasamy R; Ahuja Publications
3. Manufacturing processes for Engineering Materials
Scrope Kalpakjian; Addison Wesley
4. Metal forming: Processes and Analysis
B. Avitzler; Tata-MGH
5. Mechanical Metallurgy
Dieter; MGH
6. Metal Working Science and Engineering
Edward M. Mielenik; MGH

Course Outcome:

After Learning the course the students shall be able to:

1. Understand Theory of plasticity and stress strain relationship.
2. Understand Different metal forming process like rolling, extrusion, forging and wire drawing
3. Analyse these process with different techniques.
4. Understand Software aspects of these processes.

List of Practical:

1. To study basics of metal forming process
2. To study theory of plasticity
3. To measure elongation at different load using UTS
4. To study rolling process
5. To study forging process
6. To study wire drawing and extrusion process
7. CAD/CAM application in metal forming process

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

SYLLABUS FOR 2nd Sem MTech PROGRAMME

Advance Welding Technology (03208152)

Type of Course: MTech

Prerequisite: Knowledge of welding

Rationale: This course provides knowledge about various types of welding, its scope and its applications in different area.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Introduction:: Importance and application of welding, classification of welding process. Characteristics of arc and mode of metal transfer, welding fluxes and coatings - type and classification; electrode codes and their critical evaluation	10%	4
2	Brief review of conventional welding process:: Classification of welding processes. Gas welding, Arc welding, MIG, TIG welding. Resistance welding. Electroslag welding, Friction welding etc. Welding of MS.CI, Al, Stainless steel & Maurer/Schaefflar Diagram. Soldering & Brazing.	15%	8
3	Advanced welding Techniques, Processes and Application:: Principle and working of advanced welding techniques such as Plasma Arc welding, Laser beam welding, Electron beam welding, Ultrasonic welding explosive welding/ cladding, Underwater welding, Thermite welding , Spray-welding / Metallising, Hard facing, Friction welding Friction stir welding, diffusion welding etc.	22%	10
4	Weld Consideration and Design:: Welding selection criteria, Welding machines/equipments and its characteristics and arc-stability, Weld Design, Welding of pipe-lines and pressure vessels. Life predication. Theory of residual stresses and distortion calculation, welding codes, joint design, analysis of fracture and fatigue of welded joints - fracture, energy consideration, fracture toughness testing and its application to welded joints.	22%	10

5	Thermal and Metallurgical consideration:: Thermal considerations for welding, temperature distribution, Analytical/Empirical analysis/formulae, heating & Four cooling curves. Metallurgical consideration of weld, HAZ and Parent metal, micro & macro structure. Solidification of weld and properties.	15%	8
6	Welding Defects and Its remedies:: Describe Weld defects and distortion with cause and its remedies, Inspection/testing of welds	10%	4
7	Modern Welding Processes:: Robot welding, welding of ceramics, plastics and composites. Safety Issues: Safety equipment and their Applicability as per respective welding process.	6%	3

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Welding processes and technology
Dr.R.S.Parmar; Khanna Publishers
2. Welding technology
R. Bittle; Tata McGraw Hill
3. American society for metals, metal hand book
4. Welding process technology-houldcraft PT-cambridge univ.press

Course Outcome:

After Learning the course the students shall be able to:

1. Demonstrate a basic understanding of different types of welding processes and their applications.
2. Demonstrate a basic understanding of advanced welding techniques.
3. Select appropriate process for various applications.
4. Demonstrate a basic understanding of metallurgical aspects of weld.
5. Select appropriate safety devices for a modern welding process.

List of Practical:

1. Prepare WPS and PQR for the given case as per ASME - Section IX.
2. Measurement of hardness, tensile properties of weld joint
3. Study various methods of improvement in weld quality
4. Effect of shielding gases on performance of GTAW process
5. Literature review for effect of flux material on weld quality
6. Nondestructive testing of welded joints
7. Industrial Visit

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

SYLLABUS FOR 2nd Sem MTech PROGRAMME

CNC Technology (03208153)

Type of Course: MTech

Prerequisite: Flow with latest manufacturing system.

Rationale: This course provides knowledge & practice of CNC machine and programming.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Introduction: Features of NC Machines, Fundamentals of numerical control, advantage of NC systems, classification of NC systems, point to point, NC and CNC, incremental and absolute, open and closed loop systems, Features on NC Machine Tools, design consideration of NC machine tool.	10%	6
2	Structure & Construction of CNC Machines: CNC Machine building, structural details, configuration and design, guide ways –Friction, Anti friction and other types of guide ways, elements used to convert the rotary motion to a linear motion – Screw and nut, recirculation ball screw, rack and pinion, spindle assembly, torque transmission elements – gears, timing belts, flexible couplings, Bearings. Swarf removal and safety considerations. Spindle drives – DC shunt motor, 3 phase AC induction motor, feed drives – stepper motor, servo principle, DC and AC servomotors, Open loop and closed loop control, Tooling requirements for turning and machining centres, Introduction to cutting tool materials – Carbides, Ceramics, CBN, PCD.	25%	15
3	CNC Part Programming: Coordinate system, structure of a part program, G & M Codes, tool length compensation, cutter radius and tool nose radius compensation, do loops, subroutines, canned cycles, mirror image, parametric programming, machining cycles, programming for two, three and five axis machining centre and turning centre.	20%	8

4	<p>Advance CNC Techniques:</p> <p>APT programming: APT language structure, APT geometry, Definition of point, time, vector, circle, plane, patterns and matrices. APT motion commands: setup commands, point-to point motion commands, continuous path motion commands, post processor commands, control commands, Macro subroutines, Part programming preparation for typical examples.</p> <p>Parametric Programming, Fuzzy Logic, Virtual and Digital Manufacturing, 3D Printing</p>	20%	8
5	<p>Industrial Robotics:</p> <p>Introduction to robotics-Classification and structure of robots, Drives and Sensors-DC motors, Stepper motors, AC servo motors, Pneumatic actuators, Hydraulic actuators, Range sensors, Proximity sensors, Encoders, Touch sensors, Force and torque sensors, Robotic vision, Various types of control schemes, Introduction to robot programming, Different types of programming languages like AL, AML, VAL etc., Industrial applications, Spray painting, Spot welding, Arc welding, drilling, Assembly operations, Concept of manufacturing cell, Safety considerations.</p>	20%	8
6	<p>Software aspect for Manufacturing:</p> <p>Introduction about Software for Manufacturing Master CAM, Pro Manufacturing, NX CAM, CNC Simulator.</p>	5%	3

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall . Groover, M. P.
2. CAD/CAM/CIM", New Age International Publishers(P) Ltd. Radhakrishnan, P., Subramanyan, S., Raju, V.
3. CAD/CAM principles and applications Rao, P.N.; Tata McGraw Hill.
4. Robotics technology and flexible automation Deb, S. R; Tata McGraw-Hill
5. CAD/CAM & Automation Farzad Haidri; Nirali Publication
6. CNC Machines: Computer Numerical Control & Automation M.S. Sehrawat, J.S. Narang; S. Chand & Company Ltd

Course Outcome:

After Learning the course the students shall be able to:

1. Understand the construction of the modern CNC machine tools.
2. Understand the construction, working and different controls of Computer Numerical Control machines. Explain drives and tooling systems used in CNC machine tools.
3. Understand feedback and adaptive control of CNC machines
4. An understanding of different types of robots construction, its movement & applications.

List of Practical:

1. Study of NC, CNC machine and G & M codes.
2. Simulation of CNC milling with programming
3. Machining on CNC Milling.
4. Simulation of CNC turning with programming.

5. Application of APT Language.
6. Application of Parametric Programming.
7. Study about robotic fundamentals.
8. Application of 3d printer.