

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
SCHEME OF TEACHING AND EXAMINATION FOR
M.TECH.-PRODUCT DESIGN & MANUFACTURING (MPD)

III Semester: INTERNSHIP

CREDIT BASED

Course Code	Subject	No. of Hrs./Week		Duration of the Exam in Hours	Marks for		Total Marks	CREDITS
		Lecture	Practical / Field Work		I.A.	Exam		
16MPD31	Seminar / Presentation on Internship (After 8 weeks from the date of commencement)	-	-	-	25	-	25	20
16MPD 32	Report on Internship	-	-	-	25	-	25	
16MPD 33	Evaluation and Viva-voce of Internship	-	-	-	-	50	50	
16MPD34	Evaluation of Project Phase 1				50	-	50	1
	Total	-	-	-	100	50	150	21

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IV Semester

CREDIT BASED

Subject Code	Subject	No. of Hrs./Week		Duration of Exam in Hours	Marks for		Total Marks	CREDITS
		Lecture	Field Work / Assignment / Tutorials		I.A.	Exam		
16MPD41	Advanced Manufacturing Practices	4	--	3	20	80	100	4
16MPD42X	Elective-III	3	-	3	20	80	100	3
16MPD43	Evaluation of Project Phase-II	-	-	-	50	-	50	3
16MPD44	Evaluation of Project Work and Viva-voce	-	-	-	-	100+100	200	10
Total		07	-	06	90	360	450	20

Elective – III	
Sub. Code	Name of the Subject
16 MPD 421	Optimization Techniques for Decision Making
16 MPD 422	Product Planning and Marketing
16 MPD 423	Agile Manufacturing
16 MPD 424	Product Analysis and Cost Optimization

Note:

- 1) Project Phase – I : 6 weeks duration shall be carried out between II and III Semesters. Candidates in consultation with the guides shall carryout literature survey / visit to Industries to finalise the topic of dissertation. .
- 2) Project Phase – II : 16 weeks duration during 4 semester. Evaluation shall be done by the committee constituted comprising of HOD as Chairman, Guide and senior faculty of the Department.
- 3) Project Evaluation: Evaluation shall be taken up at the end of 4 semester. Project work and evaluation and Viva Voce examination shall be conducted.
 - a. Internal Examiner shall carry out the evaluation for 100 marks
 - b. External Examiner shall carry out the evaluation for 100 marks.
 - c. The average of marks allotted by the internal and external examiner shall be the final marks of the project evaluation.
 - d. Viva-Voce examination of project work shall be conducted jointly by Internal and External examiner for 100 marks

IV SEMESTER

ADVANCED MANUFACTURING PRACTICES

Subject Code	: 16MPD41	IA Marks	: 20
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

MODULE 1

JIT – Introduction – The spread of JIT Movement, some definitions of JIT, core Japanese practices of JIT, Creating continuous Flow Manufacture, Enabling JIT to occur, Basic elements of JIT, Benefits of JIT.

Just in Time Production – Primary purpose, profit through cost reduction, Elimination of over production, Quality control, Quality Assurance, Respect for Humanity, Flexible work Force, JIT Production Adapting to changing production Quantities, process layout for shortened lead Times, Standardization of operation, Automation.

MODULE 2

Sequence and scheduling used by suppliers: Monthly and daily Information. Sequenced withdrawal system by sequenced schedule table, problems and counter measures in applying the Kanban system to sub contractors.

Toyota Production System-The philosophy of TPS, Basic Frame work of TPS, Kanban, Determining the Number of Kanban in Toyota Production System.

- Kanban Number under Constant Quantity Withdrawal System.
- Constant Cycle, Non-constant Quantity Withdrawal System. Supplier Kanban and the Sequence Schedule for Use by Suppliers.
- Later Replenishment System by Kanban.
- Sequenced Withdrawal System.
- Circulation of the Supplier Kanban within Toyota.

Production Smoothing in TPS, Production Planning, Production Smoothing
Adaptability to Demand Fluctuations, Sequencing Method for the Mixed Model Assembly Line to Realize Smoothed Production of Goal.

MODULE 3

Just-in-Time Production with Total Quality Control just in time concept, cutting lot sizes, cutting set-up times, cutting purchase order costs, the JIT cause-Effect chain, Scrap/Quality Improvements, Motivational effects, Responsibility effects, small Group improvement Activities, withdrawal of Buffer Inventory, the total Quality Control Concept.

MODULE 4

Total Quality Control-Introduction-Total Quality Control concepts, responsibility, learning from the west, TQC concepts categorized, Goals, Habit of improvement, perfection, Basics, process control, Easy to see Quality control as facilitator, small lot sizes, Housekeeping, Less than full capacity scheduling, Daily machine checking, Techniques and Aids, Exposure of problems, Fool proof Devices, Tools of Analysis, QC Circles, TQC in Japanese-owned US Electronics plant, TQC in Japanese-owned Automotive plants.

MODULE 5

Plant Configurations: Introduction-ultimate plant configuration, job shop Fabrication, Frame Welding, Forming Frame parts from Tubing, Dedicated production lines, overlapped production, the daily schedule, Forward Linkage by means of Kanban, physical merger of processes, Adjacency, mixed Models, Automated production Lines, Pseudo Robots, Robots, CAD and Manufacturing, Conveyors and stacker Cranes, Automatic Quality Monitoring.

REFERENCE BOOKS:

1. **Toyota Production system** – An integrated approach to just in time – by Yasuhiro Monden - Hardcover – 1993.
2. **Lean Thinking** – By James Womack.- **ISBN:** 0-7432-4927-5.
3. **The machine that changed the World – The story of Lean production** – by James P. Womack, Daniel T Jones, and Daniel Roos – Harper Perennial edition published 1991.
4. **Just in time manufacturing (manual)** – Kargoanker.

Elective - III

OPTIMISATION TECHNIQUES FOR DECISION MAKING

Subject Code	: 16MPD421	IA Marks	: 20
No. of Lecture Hours/Week	: 03	Exam Hours	: 03
Total No. of Lecture Hours	: 40	Exam Marks	: 80

MODULE 1

Introduction: Engineering application of optimization, multivariable optimization Statement of a optimization problem. Design Vector, Design constraints, objective function, classification of optimization problems.

Classical Optimization Technique: Single variable optimization, with equality Constraints solution by direct substitution, solution by the method of constrained Variation. Solution by the method of Lagrange multipliers, multivariable optimization with inequality constraints Kuhn – Tucker condition.

MODULE 2

Non-linear Programming: (One Dimensional minimization method) Numerical method, Unimodal function, Unrestricted search, Exhaustive search. Dichotomous search, Fibonacci and Golden section method.

MODULE 3

Interpolation Method: Quadratic and Cubic Nonlinear programming (Unrestricted Optimization Technique) Random search methods, Univariate method, powels method, Simplex method.

MODULE 4

Descent Methods: Steepest descent, conjugate gradient, variable metric method.

Non Linear Programming: (Constrained Optimization problem) Characteristic of a constrained problem.

MODULE 5

Direct Methods: The complex method, cutting plane method, methods of Feasible directions.

Indirect Methods: Transformation technique, change variables and elimination of variables, penalty function methods- interior and exterior penalty function.

TEXT BOOKS:

1. **Optimization, “Theory and Application”** - S.S. Rao - Willey Eastern - 1984

REFERENCE BOOKS:

1. **Optimization methods for Engg. Design** - R.L Fox - Addison – Wesley – ISBN 0201020785 -1971
1. **Optimisation Theory and Practice** - GSG Beveridge and R.S. Schechter - McGraw Hill, New York – 1970.
2. **Optimisation and Probability in System Engg.**- Ram - Van Nostrand – 1974.

PRODUCT PLANNING AND MARKETING

Subject Code	: 16MPD422	IA Marks	: 20
No. of Lecture	: 03	Exam Hours	: 03
Hours/Week			
Total No. of Lecture Hours	: 40	Exam Marks	: 80

MODULE 1

Product strategy and planning product - market evolution, successful product development process, characteristics of successful product development

New Product Strategy: Strategic response, reactive versus proactive strategies, marketing versus Research and Development, Comprehensive strategy.

MODULE 2

Proactive new product development process - Sequential decision process, reasons for product failure and strategies to avoid failures, cost, time, risk and expected benefit in new product development.

MODULE 3

Opportunity Identification - Market definition and entry strategy, desirable characteristics of markets, market profile analysis, methods for market definition, target group selection through market segmentation, market selection, idea generation – idea sources, method of generating ideas, idea management.

MODULE 4

Consumer measurement and Perceptual mapping – Consumer measurement process, research methods, sampling, measuring instruments, attitude scaling, Consumers perceptions of new and existing products: Perceptual positioning, Perceptual maps, Analytic Methods used to produce Perceptual maps, Managerial review of maps.

Product positioning – Preference analysis and benefits, segmentation- Role of preference in product positioning, proactive product positioning, Analytic preference models and estimation methods, Benefit segmentation, managerial use of preference models.

MODULE 5

Forecasting sales potential – Role of purchase potential in design process, models of purchase potential, models of sales formation, managerial use of purchase models.

Launching the products and Strategy for Testing new products – Planning and tracking launch of durable and industrial products, advertising testing and product quality testing

TEXT BOOKS:

1. Glen L. Urban. John R. Hauser, “**Design and Marketing of New products**” A Prentice Hall, Englewood cliffs, New Jersey, 1993
2. William L. Moore & Edgar, “**Product Planning and Management**”, A. Pessemer

AGILE MANUFACTURING

Subject Code	: 16MPD423	IA Marks	: 20
No. of Lecture Hours/Week	: 03	Exam Hours	: 03
Total No. of Lecture Hours	: 40	Exam Marks	: 80

MODULE 1

Introduction: what is agile Manufacturing? -Competitive environment of the future- the business case for agile manufacturing conceptual framework for agile manufacturing.

Four Core Concepts: strategy driven approach- integrating organization, people technology interdisciplinary design methodology.

MODULE 2

Agile Manufacturing and Change Management: The change implications, post failures in advanced manufacturing, changes on the way, traditional management accounting, paradigm, investment appraisal, product costing - performance, Measurement and control systems.

Control technological and Design paradigms - traditional problems in workplace- organizational issues -role of technology.

MODULE 3

Agile Manufacturing Enterprise Design: Agile manufacturing –enterprise design -system concepts as the basic manufacturing theory-joint technical & organizational design as a model for the design of agile manufacturing enterprise,, enterprise design process -insights into design processes, what is interdisciplinary design, Main issues - simple design example.

MODULE 4

Skill & Knowledge Enhancing Technologies For Agile Manufacturing: Skill and Knowledge enhancing Technologies -scheduling -technology design strategic-

MODULE 5

Design Concepts. Design & Skill of Knowledge enhancing Technologies for machine tool systems- Historical Overview, Lessons, Problems and Future Development.

REFERENCE BOOKS:

1. **Agile Manufacturing -Forging new Frontiers** - Paul T. Kidd - Addison Wesley- Publication- 1994.
2. **Agile Manufacturing -Proceeding of International Conference on Agile Manufacturing** Dr. M.P Chowdiah (Editor), TATA Mc Graw Hill Publications 1996.
3. **Concurrent Engg** - Paul T Kidd – Addison Wesley Publication -1994
4. **World Class manufacturing** - Paul T Kidd – Addition Wesley Pub - 1994

PRODUCT ANALYSIS AND COST OPTIMIZATION

Subject Code	: 16MPD424	IA Marks	: 20
No. of Lecture Hours/Week	: 03	Exam Hours	: 03
Total No. of Lecture Hours	: 40	Exam Marks	: 80

MODULE 1

Introduction: New products, new product strategy -market definition Idea generation introduction to the design process -forecasting sales potential -product engineering and markets-monopoly competitive.

Manufacturing Planning: Selection of optimum process, standardization. Break even analysis- application and area of use -problems -multi - product analysis.

MODULE 2

Value Analysis: Steps in selection, analysis and implementation, Selection of cutting speed for optimum cost - problems.

Cost Accounting: Cost estimation -difference -types -steps involved in cost estimation.

MODULE 3

Types of Cost: Cost Centres, Direct –indirect, material cost -direct indirect material cost Overhead cost, Elements in overheads: Preparation of cost sheet, machine hour rate, apportioning methods

MODULE 4

Variance Analysis – Labour variance, Material variance and Overhead variance, Activity based costing - Introduction to target costing.

MODULE 5

Cost Calculation: Cost calculation for machined components, welding, casting and forged components illustrations - calculation of sales cost.

Cost Optimization Techniques: Analytical, Graphical and incremental methods Learning curves.

TEXT BOOKS:

1. **Design and Marketing of New Products** - Glen L Urban - John R Hauser- Prentice Hall. New Jersey, 1980.
2. **Production and Costing** - Narang CBS & Kumar V - Khanna Publishers- 2001.

REFERENCE BOOKS:

1. **Cost management in the New Manufacturing Age** -Yasuhiro Monden, ProductivityPress-1992.
2. **Technique for Value Analysis And Engineering** - Miles Lawrence.D - McGraw Hill, New york-1972.

