



ADAMAS UNIVERSITY

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Minor in Production Management

Syllabus

W.e.f. AY 2020-21

**ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING & TECHNOLOGY**

Course Structure

Course Code	Courses	LTPC	Credit
EME42125	Fundamentals of Manufacturing	3003	3
EME42225	Fundamentals of ManufacturingLab	0021	1
EME42128	Ergonomics	3003	3
EME42228	Ergonomics Lab	0021	1
EME43145	Lean Manufacturing	3003	3
EME43245	Lean Manufacturing Lab	0021	1
EME43148	Production Planning	3003	3
EME44157	Total Quality Management	3003	3
EME43402	Minor Programme Project	---2	2
Total			20

Fundamentals of Manufacturing	EME42125	3-0-0	3 Credits	Contact Hours
Module 1: Metal Casting Processes Casting – principle and classification, sand mould casting - basic principles, solid casting and hollow casting, patterns - types, material and design including pattern allowances, moulding sands - composition, preparation, properties and testing, core - purpose, definition, materials, preparation and applications, design of gating system, limitations and applications of top gate, bottom gate, parting gate and step gate; estimation of pouring time for top gate and bottom gate type moulds, floor mould casting - principles, method, relative advantages and applications, shell mould casting, pit mould and loam mould casting, CO ₂ moulds casting, centrifugal casting (pure, semi and centrifuging types) investment casting, casting defects - types, causes and remedy				8
Module 2: Forging general principles of forming processes, major classification with typical examples, hot working and cold working processes, advantage and disadvantages of hot working and cold working processes and applications. Forging - principle and classification giving few example of applications, work materials for different forging operations, tools and equipment required for forging, smithy, drop forging and press forging (pressing) methods and use, forging dies - types, materials and design, various defects occurred due to sheet metal forming, types, causes, effects and remedy.				8
Module 3: Rolling, Extrusion and Wire drawing rolling - basic principles and general applications, characteristics and applications of hot rolling and cold rolling, various rolling processes and applications and rolled products, roll pass design for different products, various defects occurred due to sheet metal forming, types, causes, effects and remedy, wire drawing and extrusion - basic principles and requirements, classification, methods and applications, work materials and products, press tool works; basic principles, system, operations and applications, shearing, parting, notching, blanking and piercing.				8
Module 4: Welding Processes welding - principle, definition and major classification, characteristics and applications of different fusion and solid state welding processes using different heat-sources, gas welding, Thermit welding, arc welding, manual arc welding, submerged arc welding, TIG and MIG welding; plasma arc welding, resistance welding, spot welding; butt welding, seam welding, laser and electron beam welding, forge welding; friction welding; diffusion welding, ultrasonic welding, pressure welding, explosive welding. Welding defects, types, causes, effects and remedy.				6
Module 5: Mechanism of Machining Machining- Introduction, Definition, Objective; Concept of producing generatrix and directrix; Producing geometrical surface in machine tool by generatrix and directrix; Geometry of cutting tools in ISO tool-in-hand and tool-in-use system. Orthogonal and oblique cutting, Mechanism of chip formation-chip reduction coefficient, shear angle, cutting strain, cutting forces -Merchant's circle diagram, determination of cutting forces, effect of tool geometry on cutting forces, Cutting temperature, causes, effects, assessment and control; Application of cutting fluid; Failure of cutting tool, tool wear, tool life; Cutting tool materials, concept of surface coating on cutting tool; assessment of machinability; machining time				10
Text Books: 1. A. B. Chattopadhyay, Machining and Machine Tools, Wiley-India, 2011. 2. S Kalpakjian, Manufacturing Engineering and Technology, Pearson, 2014.				
Reference Books: 1. Black & Kohser, Materials & processes in manufacturing-, Wiley, 2013. 2. G. Boothroyd and W. A. Night, Fundamentals of Machining and Machine Tools, CRC Press, 2005.				

Fundamentals of Manufacturing Lab	EME42225	0-0-2	1 Credit
List of Experiments			
1.	To find the effect of water content, clay content on green permeability of mould sand.		
2.	To find the green compression strength of the given specimen at different percentage of clay and moisture.		
3.	To find the distribution of sand grains using a set of sieves and to find the average grain fineness number.		
4.	To prepare a mould for casting operation (Aluminium Casting) and characterize the defects.		
5.	To prepare a Lap Joint Using MIG Welding		
6.	To prepare a V – Butt Joint Using TIG Welding.		
7.	To prepare a butt joint using OAW.		
8.	To make an S-hook from a given round rod, by following hand forging operation.		
9.	To make a ring of low carbon steel by using open die hammer forging		
10.	To make a tong of low carbon steel by using open die hammer forging		
11.	Study of Formation of Chips and Chip Reduction Coefficient in Pure Orthogonal Cutting during Longitudinal Turning.		
12.	Study of Chip Reduction Coefficient in Pure Orthogonal Cutting during Shaping.		

Ergonomics	EME42128	3-0-0	3 Credits	Contact Hours
Module 1: Ergonomics and Industrial Design Introduction-general approach to the man-machine relationship-workstation design-working position. Interdisciplinary nature of ergonomics modern ergonomics human performance – information processing – factors affecting human performance – physical workload and energy expenditure.				8
Module 2: Ergonomics and Production Ergonomics and product design -ergonomics in automated systems- expert systems for ergonomic design, Anthropometric data and its applications in ergonomic, design- limitations of anthropometric data- use of computerized database. Methods, Standards and Work Design: Determination of work content, workstation, work methods, and times required for various occupational jobs/tasks.				8
Module 3: Human Posture and Movement Human body- structure and function, Posture and job relation, Posture and body supportive devices, Vertical work surface, Horizontal work surface, Visual performance, Visual Effects of Line and Form: The mechanics of seeing- psychology of seeing, Colour: Colour and light -colour and objects- colour and the eye -colour consistency- colour terms- reactions to colour and colour continuation -colour on engineering equipments.				9
Module 4: Ergonomic design process Ergonomics design methodology, design process involving ergonomics check, checklists for task easiness, Workstation design, Furniture support, Vertical arm reach and design application possibility, Humanising design: Design and human compatibility, comfort and adaptability aspects. Design of tasks/jobs, workplace, and work environment to increase productivity, eliminate waste, and decrease occupational injury/illness.				9
Module 5: Performance support and work environment Relevant physical factors of the work environment, Standards and Social Aspects, ergonomic aspects of the working environment and work organisation, Design Ergonomics with context to India.				6
Text Books: 1. R. C. Bridger, Introduction to Ergonomics, McGraw Hill Publications -1995. 2. Martin Helander, A Guide to Ergonomics of Manufacturing, TMH, 1996.				
Reference Books: 1. Sanders & McCormick, Human Factor Engineering, McGraw Hill Publications, 2002. 2. Brain Shakel (Edited), Applied Ergonomics Hand Book, Butterworth scientific. London,				

Ergonomics Lab	EME42228	0-0-2	1 Credit
List of Experiments			
1.	Static anthropometry, standing heights		
2.	Arm forward reaches, standing erect and forward bend		
3.	Sitting Anthropometry, static heights		
4.	Horizontal work surface at around elbow height		
5.	Effective work platform height, standing		
6.	Effective vertical work surface		
7.	Hand dimension		
8.	Human dimensional consideration for general seating		
9.	Squatting posture		
10.	Body movement ranges		

Production Planning	EME43148	3-0-0	3 Credits	Contact Hours
Module 1: Product strategy and planning product Market evolution & analysis, 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, preplanning production, capacity planning, challenges in production planning.				8
Module 2: Product development and planning 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. Material Resource Planning, and Selection of material methods, machines & manpower.				8
Module 3: Inventory Planning Progress control through records and charts. Types of inventories, Inventory Classification. Inventory Control under constraints, Economic lot (batch) size. Overestimate and underestimate. Trends in purchasing and store keeping.				7
Module 4: Demand forecasting and Aggregate Production Planning Forecasting time horizon, forecasting logic, forecasting data, models for forecasting, extrapolative methods using time series, causal methods of forecasting, accuracy of forecasts, challenges in a actual forecast. Aggregate production planning: planning hierarchies in operations, aggregate production planning, need, framework for aggregate planning, alternatives for managing supply, basic strategies for aggregate production planning, aggregate production planning methods, OR tools for production planning, Master production scheduling, related problems				9
Module 5: Resource Planning & Productivity Resource planning: Dependent demand attributes, planning a framework, MRP Logic, MRP system, CRP, DRP, MRP II, ERP, Resources planning in services, related problems. Scheduling of operations: need for scheduling, loading of machines, scheduling context, scheduling flow shops, scheduling of job shops, input output control, operational control issues in mass production systems, operations planning and control.				8
Text Books: 1. Samuel Eilon, Elements of Production Planning & Control, Universal Publishing Corporation, 1991. 2. William L. Moore & Edgar, Product Planning and Management, McGraw-Hill, 1993				
Reference Books: 1. R. Pannarselam, Production and Operations Management: Prentice Hall of India Pvt., Ltd. 2. J.L. Riggs, Production System – Planning Analysis and Control, John Wiley & Sons.				

Lean Manufacturing	EME43145	3-0-0	3 Credits	Contact Hours
Module 1: Principles of Lean Manufacturing Review of manufacturing paradigm; Objectives of lean manufacturing, key principles and implications of lean manufacturing, traditional versus lean manufacturing characteristics; Value creation and waste elimination-major kinds of manufacturing waste, concept of takt time, continuous flow, continuous improvement, single piece flow. The rise of lean production.				7
Module 2: Lean Manufacturing Tools and Methodologies Value stream mapping: Current state and future state value stream mapping; Standard work: Communication of standard work to employees, visual controls; Quality at the source, 5S principles, Total Productive Maintenance, Changeover and setup time reduction; Production leveling-Failure mode and effect analysis, line balancing, mistake proofing, case studies.				8
Module 3: Just in Time (JIT) and Kanban System Group technology philosophy: Part family, Machine cell design and analysis; Elements of JIT, JIT implementation requirements JIT application for job shops, case studies. Kanban system: Kanban rules supplier Kanban and sequence schedule used by supplier. Monthly information & daily information. Later replenish system by Kanban sequenced withdrawal P system by sequence schedule table - problems & counter measures in applying Kanban system to subcontractors -Supplier Kanban circulation in the paternal manufacturer - structure of supplier Kanban sorting office.				9
Module 4: Lean Manufacturing Implementation Road map for lean manufacturing implementation; Reconciling lean with other systems, lean six sigma, integrating lean principles in ERP and PLM; Lean production in Industry 4.0: Impact of industry 4.0 on lean production system, case studies.				8
Module 5: Lean Enterprise Management Finance, Career ladders, geographic spread and advantages of global enterprise. Toyota Takaoka Mass Production V/s lean production, diffusing lean production. Prospects for catching up. Simplicity in the natural state: institutional factors -life time employment - educational commodities -quality & productivity in full circle.				8
Text Books: 1. Askin R G, Goldberg J B, "Design and Analysis of Lean Production Systems", John Wiley and Sons Inc., 2003. 2.S. R. Devadasan, V. Sivakumar, "Lean and Agile Manufacturing: Theoretical, Practical and Research futurities", PHI, 2012.				
Reference Books: 1. Richard Schourberger, Japanese Manufacturing Techniques, ASQC Press 1991. 2. James P Womack - Daniel T Jones - and Daniel Roos, The Machine that changed the World. The Story of Lean Production - Harper Perennial publishing, 1991. 3. Yasuhiro Monden, Toyoto Production System -An integrated approach to Just in Time, Engineering aild Management Press -Institute of Industrial Engineers Norcross Georgia -1983.				

Lean Manufacturing Lab	EME43245	0-0-2	1 Credit
List of Experiments			
1.	Apply Lean Manufacturing in Automation		
2.	Elimination of waste in time, transportation and waiting in a process.		
3.	Construct spaghetti dia gram for a process within a department.		
4.	Apply Lean manufacturing in Food Industry		
5.	Analysis of Space Utilization		
6.	Analysis of waste and defects for a process.		
7.	Lean laboratory lay out design.(Using Three concepts)		
8.	Qualitative Comparison of Three Concept Laboratory Layouts.		
9.	Study of overall equipment effectiveness of a plant/ layout		
10.	An Architectural Layout of the Materials Testing Section.		
11.	An Architectural Layout of the CAD Section.		

Total Quality Management	EME44157	3-0-0	3 Credits	Contact Hours
Module 1: Quality and Total quality Management (TQM) TQM-Definition, basic approach, gurus of TQM, TQM framework, a wareness, defining quality, historical review, obstacles, benefits of TQM, Need for quality – Evolution of quality, of quality – Barriers to TQM – Quality statements – Customer focus – Customer orientation, Customer satisfaction, Customer complaints and Customer retention – Costs of quality.				8
Module 2: TQM Principles Leadership – Strategic quality planning, Quality Councils – Employee involvement – Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDCA cycle, 5S, Kaizen – Supplier partnership – Partnering, Supplier selection, Supplier Rating.				8
Module 3: TQM Tools and Techniques The seven traditional tools of quality – New management tools – Six sigma: Concepts, Methodology, applications to manufacturing, Tools for concept development, tools for design development, tools for design optimization, tools for design verification, Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types. affinity diagram, interrelationship digraph, tree diagram, matrix diagram, prioritization matrices, process decision program chart, a ctivity network diagram.				8
Module 4: Continuous Process Control Pareto diagram, process flow diagram, cause and-effect diagram, check sheets, histograms, statistical fundamentals, Control charts, state of control, out of control process, control charts for variables, control charts for attributes, scatter dia grams, case studies. Control Charts – Process Capability – Concepts of Six Sigma – Quality Function Development (QFD) – Ta guchi quality loss function – TPM – Concepts, improvement needs – Performance measures.				8
Module 5: Quality Systems Need for ISO 9000 – ISO 9001-2008 Quality System – Elements, Documentation, Quality Auditing – QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – TQM Implementation in manufacturing and service sectors.				8
Text Books: 1. Dale H. Besterfiled, Total quality Management, Pearson Education Asia, 2006.				
Reference Books: 1. James R. Evans and William M. Lindsay, “The Management and Control of Quality, Cengage Learning, 2012. 2. Suganthi.L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd., 2006. 3. Janakiraman. B and Gopal.R.K., “Total Quality Management – Text and Cases”, Prentice Hall (India) Pvt. Ltd., 2006.				