VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination – 2018-19
M.Tech(Production Management)(MPM)
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

I SEMESTER

Sl. No	Course	Course Code	CourseTitle	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Field work/ Assignment	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	18MPM11	Mathematics	04	--	03	40	60	100	4
2	PCC	18MPM12	Theory Of Metal Cutting	04	--	03	40	60	100	4
3	PCC	18MPM13	Lean Manufacturing Systems	04	--	03	40	60	100	4
4	PCC	18MPM14	Computer Integrated Manufacturing & Automation	04	--	03	40	60	100	4
5	PCC	18MPM15	Non-Traditional Machining Processes	04	--	03	40	60	100	4
6	PCC	18MPML16	Laboratory	-	04	03	40	60	100	2
7	PCC	18RM117	Research Methodology and IPR	02	--	03	40	60	100	2
			TOTAL	**22**	**04**	**21**	**280**	**420**	**700**	**24**

Note: PCC: Professional core, PEC: Professional Elective.

Internship: All the students have to undergo mandatory internship of 6 weeks during the vacation of I and II semesters and /or II and III semesters. A University examination shall be conducted during III semester and the prescribed credit shall be counted forthe same semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared as failed and have to complete during the subsequent University examination after satisfying the internship requirements.

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II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Field work/ Assignment	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	18MPM21	Theory Of Metal Forming	04	--	03	40	60	100	4
2	PCC	18MPM22	Operations Management	04	--	03	40	60	100	4
3	PCC	18MPM23	Non - Destructive Testing	04	--	03	40	60	100	4
4	PEC	18MPM24X	Professional elective 1	04	--	03	40	60	100	4
5	PEC	18MPM25X	Professional elective 2	04	--	03	40	60	100	4
6	PCC	18MPML26	Laboratory	--	04	03	40	60	100	2
7	PCC	18MPM27	Technical Seminar	--	02	--	100	--	100	2
TOTAL				**20**	**06**	**18**	**340**	**360**	**700**	**24**

Note: PCC: Professional core, PEC: Professional Elective.

Professional Elective 1		Professional Elective 2	
Course Code under 18MPM24X	**Course title**	**Course Code under 18MPM25X**	**Course title**
18MPM241	Quantitative Techniques In Decision	18MPM251	Supply Chain Management
18MPM242	Quality And Reliability Engineering	18MPM252	Human Resource Management
18MPM243	Tool Engineering	18MPM253	Advanced Joining Processes

Note:

1. Technical Seminar:CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. Participation in the seminar by all postgraduate students of the same and other semesters of the programme shall be mandatory.

The CIE marks awarded for Technical Seminar, shall be based on the evaluation of Seminar Report, Presentation skill and Question and Answer session in the ratio 50:25:25.

2. Internship: All the students shall have to undergo mandatory internship of 6 weeks during the vacation of I and II semesters and /or II and III semesters. A University examination shall be conducted during III semester and the prescribed credit shall be counted in the same semester.Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared as failed and have to complete during the subsequent University examination after satisfying the internship requirements.

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III SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Field work/ Assignment	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	18MPM31	Total Quality Management	04	--	03	40	60	100	4
2	PEC	18MPM32X	Professional elective3	04	--	03	40	60	100	4
3	PEC	18MPM33X	Professional elective 4	04	--	03	40	60	100	4
4	Project	18MPM34	Evaluation of Project phase -1	--	02	--	100	--	100	2
5	Intenship	18MPMI35	Internship	(Completed during the intervening vacation of I and II semesters and /or II and III semesters.)		03	40	60	100	6
TOTAL				12	02	12	**260**	**240**	**500**	**20**

Note: PCC: Professional core, PEC: Professional Elective.

Professional elective 3		Professional elective 4	
Course Code under 18MPM32X	**Course title**	**Course Code under 18MPM33X**	**Course title**
18MPM321	Rapid Prototyping	18MPM331	Simulation And Modeling Of Manufacturing Systems
18MPM322	Advanced Fluid Power Systems	18MPM332	Advanced Foundry Technology
18MPM323	Surface Treatment And Finishing	18MPM333	Project Management

Note:

1. Project Phase-1: Students in consultation with the guide/co-guide if any, shall pursue literature survey and complete the preliminary requirements of selected Project work. Each student shall prepare relevant introductory project document, and present a seminar.
CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide if any, and a senior faculty of the department. The CIE marks awarded for project work phase -1, shall be based on the evaluation of Project Report, Project Presentation skill and Question and Answer session in the ratio 50:25:25.
SEE (University examination) shall be as per the University norms.

2. Internship: Those, who have not pursued /completed the internship shall be declared as failed and have to complete during subsequent University examinations after satisfying the internship requirements.
Internship SEE (University examination) shall be as per the University norms.

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IV SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Field work/ Assignment	Duration in hours	CIE Marks	SEE Marks Viva voce	Total Marks	
1	Project	18MPM41	Project work phase -2	--	04	03	40	60	100	20
			TOTAL	--	**04**	**03**	**40**	**60**	**100**	**20**

Note:

1. Project Phase-2:

CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a Senior faculty of the department. The CIE marks awarded for project work phase -2, shall be based on the evaluation of Project Report subjected to plagiarism check, Project Presentation skill and Question and Answer session in the ratio 50:25:25.

SEE shall be at the end of IV semester. Project work evaluation and Viva-Voce examination (SEE), after satisfying the plagiarism check, shall be as per the University norms.

SEMESTER – I

THEORY OF METAL CUTTING

Subject Code : 18MPM 12	**CIE MARKS: 40**
Number of Lecture Hours/Week : 04	**SEE Marks : 60**
Total Number of Lecture Hours : 50	**Exam Hours : 03**

Course Objective: The student will learn to
1 To understand the mechanics of chip formation, Geometry, tool material and tool life.
2 To get an exposure on dynamometers for measuring cutting forces
3. To understand theThermal aspects andselection of cutting fluids.
4. To analyze the Cutting speed and Cost of machining with advanced techniques.

MODULE- 1
Mechanics Of Metal Cutting:Mechanism of chip formation, Orthogonal & Oblique cutting, types of chips, built-up edge, Determination of shear plane angle, forces on the chips, forces in orthogonal cutting, Merchant circle diagram and analysis, Theory of Lee & Shaffer, co-efficient of friction, power & energy relationship, velocity relationship, shear-strain, factors affecting forces and power, problems
Geometry Of Cutting Tools: Single point and multi point cutting tools, tools nomenclature, tool point reference systems, tool signature, Recommended tool angles, Effect of cutting parameters on tool geometry

MODULE- 2
Tool Materials And Their Properties: Characteristics of tool materials, types of tool materials – carbon tool steels, high speed steels, cast alloys, cemented carbides, ceramics, diamonds, SIALON, CBN, UCON, recommended cutting speeds for the above tools, discussion on die steels, air, water, oil hardening of tools and their applications
Tool Wear, Tool Life: Mechanisms of tool wear, Sudden & gradual wear, crater wear, flank wear, tool failure criteria, tool life equations, effect of process parameters on tool life, tool life tests, conventional & accelerated tool wear measurement, machinability index

MODULE- 3
Measurement Of Cutting Forces: Reasons for measuring cutting forces, Classification of cutting force dynamometers – mechanical, hydraulic, pneumatic, optical, inductance, piezoelectric, and strain gage type dynamometers,
Dynamometers For Machine Tools: Dynamometers for lathe, drilling, grinding and milling, Calibration of dynamometers

MODULE- 4
Thermal Aspects In Metal Cutting: Heat sources in metal cutting, temperature in chip formation, temperature distribution, and experimental determination of tool temperatures.
Cutting Fluids: Basic actions of cutting fluids, properties of cutting fluids, selection of cutting fluids, application of cutting fluids, filtration of fluids, recommended cutting fluids.

MODULE- 5

Economics Of Machining: Introduction, elements of total production cost, optimum cutting speed and tool life for minimum cost, optimum cutting speed and tool life for maximum production, problems.

Advanced Machining Techniques: Cryo machining & high speed machining. Causes of vibration and chatter in machining, and their remedy

Course Outcomes: On completion of the course the student will be

1.Able to analyze the Mechanism of chip formation, Geometry, tool material and tool life.

2.Able to use of dynamometers for measuring cutting forces.

3.Able to analyze the Thermal Aspects and selection of cutting fluids.

4.Able to calculate the Cutting speed and Cost of machining with advanced techniques.

Text Books:

1. Metal Cutting Principles - M.C. Shaw - Oxford Publication – 1985.

2. Fundamentals of metal cutting & Machine Tools-by B.L.Juneja& G.S–Sekhar - Wiley Eastern.

3. Metal Cutting - V.C.Venkatesh&S.Chandrasekhanan - Pantice Hall – 1991.

4. Metal Cutting - Dr. B.J.Ranganath -Vikas Publications

LEAN MANUFACTURING SYSTEM

Subject Code : 18MPM 13	**CIE MARKS: 40**
Number of Lecture Hours/Week : 04	**SEE Marks : 60**
Total Number of Lecture Hours : 50	**Exam Hours : 03**

MODULE 1

Just in time production system. JIT Logic -Pull system Japanese approach to production elimination of waste - JIT implementation requirements JIT application for job shops, Case studies

MODULE 2

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.

MODULE 3

The rise of lean production: - Birth place, concrete example, company as community, Final assembly plant, product development and engineering. Changing customer demand, dealing with the customer, future of lean production.

Shortening of production lead times: reduction of setup times, practical procedures for reducing setup time.

MODULE 4

Standardization of operations: Machine layout, multi function workers and job rotation. Improvement activities to reduce work force and increase worker morale -foundation for improvements.

Elements of lean production viz G M Framingharn: Toyota Takaoka Mass Production V /s lean production, diffusing lean production.

MODULE 5

Managing lean enterprise:- Finance, Career ladders, geographic spread and advantages of global enterprise.

Prospects for catching up. Simplicity in the natural state: institutional factors -life time employment -educational commodities -quality & productivity in full circle.

REFERENCE BOOKS:

1. Productions and Operations Management - ChaselAquilino - Dreamtech latestedition.
2. Toyoto Production System -An integrated approach to Just in Time - Yasuhiro Monden - Engineering aild Management Press -Institute of Industrial Engineers Norcross Georgia -1983.
3. The Machine that changed the World. The Story of Lean Production - James P Womack - Daniel TJones - and Daniel Roos -Harper Perennial - edition published 1991.
4. Lean Thinking - James Womack – ISBN 0743249275 –2003.
5. Japanese Manufacturing Techniques. The Nine Hidden Lessons by simplicity - Richard Schourberger - ASQC Press1991.
6. Quality Function Development - James Bossert - ASQC Press1991.

COMPUTER INTEGRATED MANUFACTURING & AUTOMATION

Subject Code : 18MPM 14	**CIE MARKS: 40**
Number of Lecture Hours/Week : 04	**SEE Marks : 60**
Total Number of Lecture Hours : 50	**Exam Hours : 03**

Course Objective: The course objective is to make students to familiarize:

1. The Basic components of CIM, CAD/CAM and its integration with CIM.
2. To analyze the automated flow lines with or without buffer storage capacity.
3. Principles of Computer Aided Process Planning and Group Technology.
4. Different Monitoring systems used in CIM, Computer Aided Quality Control and FMS.

MODULE- I

Introduction ToCim: Manufacturing - Types, Manufacturing Systems, CIM Definition, CIM wheel, CIM components, Evolution of CIM, needs of CIM, Benefits of CIM.

High Volume Production System: Introduction Automated flow line-symbols, objectives, Work part transport-continuous, Intermittent, synchronous, Pallet fixtures, Transfer Mechanism-Linear-Walking beam, roller chain drive, Rotary-rack and pinion, Ratchet & Pawl, Geneva wheel,

MODULE- 2

Analysis Of Automated Flow Line & Line Balancing: General terminology and analysis, Analysis of Transfer Lines without storage-upper bound approach, lower bound approach and problems, Analysis of Transfer lines with storage buffer, Effect of storage, buffer capacity with example problem, Partial automation-with numerical problem example, Manual Assembly lines line balancing problem

MODULE- 3

Automated Process Planning: Group Technology, Part families, Part classification and coding, Production flow analysis, Machine cell design, Applications and Benefits of Group Technology, Structure of a Process Planning, Process Planning function, CAPP - Methods of CAPP, CAD based Process Planning,

MODULE- 4

Monitoring And Quality Control: Types of production monitoring system, process control & strategies, direct digital control - Supervisory computer control - computer aided quality control - objectives of CAQC, QC and CIM, contact, non-contact inspection methods, CMM and Flexible Inspection systems

MODULE- 5

Flexible Manufacturing Systems: FMS concept, Components of FMS, FMS Layouts, FMS planning and implementation. Tool Management systems-Tool monitoring, Work holding devices- Modular fixturing, flexible fixturing,, flexibility, application and benefits of FMS, automated material handling system –AGVs, Guidance methods, AS/RS.

Course Outcomes:

After studying this course students will be able to:

1. Identify different production systems and integrate them into a computer integrated manufacturing system.
2. Able to discuss different high volume production systems and draw comparisons about their efficacy in automated systems.
3. Analyze automated flow lines with or without buffer storage capacity.
4. Elucidate different aspects of computerized planning and Computer aided quality control systems.
5. Able to explain concepts of Flexible manufacturing systems.

Text Books:

1. Mikell P. Groover, Automation, Production system & Computer Integrated Manufacturing, Prentice Hall India Learning Private Limited, 3rdEdition, 2008.
2. Kant Vajpayee. S., Principles of Computer Integrated Manufacturing, Prentice Hall of India, 1999.

Reference Books:

1. James A. Rehg& Henry W Kraebber, Computer Integrated Manufacturing, Pearson Prentice Hall, 2005.
2. YoremKoren, Computer Control of Manufacturing Systems, Mc. Graw Hill, 1983.
3. P. Radhakrishnan, S. Subramanyan and V. Raju, CAD / CAM / CIM, New Age International Publishers, 2008.

NON-TRADITIONAL MACHINING PROCESSES

Subject Code : 18MPM 15 **CIE MARKS: 40**
Number of Lecture Hours/Week : 04 **SEE Marks : 60**
Total Number of Lecture Hours : 50 **Exam Hours : 03**

Course Objective:
The main objectives of this course are:

1.To provide the students with a proper understanding of NTM processes and difference between NTM and TM.
2.To expose the students with different types of NTM processes and their applications.
3.To expose the students with different types of high velocity forming process.

MODULE- I
Introduction: Definition and need for NTM process, difference between NTM and TM, Classification of NTM, Process selection and comparative study of different processes.Ultrasonic Machining (USM) – Introduction, Mechanism of metal removal, elements of process, Tool feed mechanism, Effect of process parameter, Advantages, Disadvantages and Applications.Abrasive Jet Machining (AJM): Introduction, working Principles, Effect of Process parameters /Variables, Advantages, Disadvantages and Applications.

MODULE- 2
Electric Discharge Machining (EDM)- Introduction and mechanism of metal removal, types of EDM, basic EDM circuitry-spark erosion generators – Relaxation generator or R-C circuit, material removal rate in relaxation circuits, critical resistance, Die electric fluids, Flushing, Electrodes and its material selection, surface finish and machining accuracy, Advantages, Disadvantages and Applications. Electro Discharge Grinding (EDG) and Wire EDM.

MODULE- 3
Electro Chemical Machining: Definition and working principal, Elements of ECM process, Chemistry of the ECM process, Process parameters, determination of the metal removal rate, Advantages, Disadvantages and Applications. Electro Chemical Grinding.
Chemical Machining: Introduction and mechanism of metal removal, Elements of process – Maskants or Resists and Etchants, Advantages, Disadvantages and Applications.

MODULE- 4
Plasma arc Machining: Introduction, Plasma, Generation of Plasma and equipment, Mechanism of metal removal, PAM parameters, type of torches.
Electron Beam Machining (EBM): Introduction and working principle of EBM, Equipment for production of Electron beam (Electron gun), Theory of electron beam machining - Thermal & Non thermal types, Advantages, Disadvantages and Applications.

MODULE- 5
Laser Beam Machining (LBM): Introduction and working principle of LBM, generation of laser, Laser Equipment (Apparatus), Types of Lasers, Process characteristics, Advantages, Disadvantages and ApplicationsHigh Velocity Forming (HVF) process: introduction, Advantages of HVF process, Types of high velocity forming methods - explosive forming, electromagnetic forming.

Course Outcomes: On completion of this course the student is expected:

1.To know the basic concepts of NTM process and their difference over TM.
2.To be conversant with different types of NTM processes and their applications.
3.To be conversant with different types of HVF processes and their applications.

Text Books:

1.Modern Machining Process - P.C Pandy& H.S. Shan - Tata McGraw Hill - ISBN: 0070965536 - Publishing Date: Feb-80.

Reference Books:

1.Production Technology - HMT - Tata McGraw Hill - ISBN-10; 0070964432.
2.High Velocity Forming of Metals - F.M Wilson - ASTME Pretice Hall.
3.Modern Manufacturing Method - Adithan - New Age International (p) Limited - ISBN: 8122408176, 2007.
4.Modern Machining Processes - P.K. Mishra - Narosa Publishing House, New Delhi - 1997.

LABORATORY

Subject Code : 18MPML 16 **CIE MARKS: 40**
Number of Lecture Hours/Week : 04 **SEE Marks : 60**
Total Number of Lecture Hours : 50 **Exam Hours : 03**

Course Objective: The course objective is to make students to familiarize:

1.The basic procedures and concepts of programming, Work set up and operation of a CNC Machining Center.
2.Identification and understanding of basic programming codes.
3.Robot Programming methods.
4.Trajectory planning concepts of the Robotic Manipulator

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PART – A

CNC Programming

Simulation of Turning, Drilling and Milling Operations using CAM Packages like CADEM, Master CAM, or any equivalent software.

1.PartModeling, Machining and Simulation for Turning (Min. of 2 Exercises)
2.Part Programing and Simulation for Turning (Min. of 2 Exercises)
3.PartModeling, Machining and Simulation for Milling (Min. of 4 Exercises)
4.Part Programing and Simulation for Milling (Min. of 2 Exercises)

PART - B

Robot Programming:

Design and Write a Robot program using Teach pendent and Offline programming to perform the following operations:

1.Pick and place operation (Min. of 2 Exercise)
2.Sorting Operation (Min. of 2Exercise).
3.Automated Storage and Retrieval System (Min. of 2Exercise).

PART - C (Only for Demo)

1.Use of trajectory planning concepts on the model of a single-link robotic manipulator.
2.To familiarize students with the use of a vision system.

Course Outcomes: After studying this course students will be able to:

1.Able to write the part programme to machine the component as per the part specification.
2.Students will be equipped with Robot programming.
3.Able to understand the trajectory planning concepts on a single-link robotic manipulator.
4.Students will be familiarized with the use of a Vision system.

Conduction of Practical Examination:

1.All laboratory experiments must be included for practical examination (Excluding Part-C).
2.Students are allowed to pick one experiment from each part and execute both.
3.PART - A: Procedure + Execution: 5 + 15 (20)
4.PART - B: Procedure + Execution: 5 + 15 (20)
5.Viva Voce (Part A + Part B + Part C): 20

SEMESTER II

THEORY OF METAL FORMING

Subject Code :18MPM 21 **CIE MARKS : 40**
Number of Lecture Hours/Week :04 **SEE Marks : 60**
Total Number of Lecture Hours :50 **Exam Hours :03**

Course Objective: The student will learn to

1. The Basic concepts of metal forming
2. Understand the types of forging operations, types of friction and defects.
3. Understand the types of rolling mills, geometrical relationships and its defects.
4. Understand extrusion processes and relationships, Drawing and its defects.
5. Understand the types of sheet metal processes and methods of HERF.

MODULE- 1

Introduction To Forming Process: Introduction to metal forming, Effect of temperature on forming process-hot working, cold working. Effect of Metallurgical structure, Effect of speed of deformation work of Plastic deformation, Friction in forming operation.
Concept of true stress and true strain, uniaxial,biaxial,triaxialstresses,Vonmoises criteria ,tresca criteria, principle stresses,concepts of plane stress and plane strain and problems

MODULE- 2

Forging: Classification, various stages during forging, Forging equipment, brief description, deformation in compression, forging of slabs, discs with respect to sticking, sliding and mixed friction forging defects. Residual stresses in forging and problems.

MODULE- 3

Rolling of Metals: Classification, forces and geometrical relationships in rolling. Expression for rolling load, roll separating force.
Variables in rolling: Deformation in rolling, Defects in rolled products, Residual stresses in rolled products. Torque and Horsepower and problems.

MODULE- 4

Extrusion: Classification, Extrusion equipment, variables in extrusion, Deformation in extrusion, Extrusion defects, Work done in extrusion and problems
Drawing: Principles of Rod and wire drawing, variables in wire drawing, Residual stresses in rod, wire and tube drawing, Defects in Rod and wire drawing and problems

MODULE- 5

Sheet Metal forming: Introduction, Forming methods, shearing and Blanking, Bending, stretch forming, Deep drawing, redrawing operations, Defects in formed products and methods of HERF.

Course Outcomes: On completion of the course the student will be

1. Understand the basics of metal forming.
2. Recognize the importance of metal forging using different geometrical shapes and various defects.
3. Understanding the concept of rolling ,types of rolling mills and processes and its defects
4. To understand the concepts of extrusion and drawing and their applications.
5. To understand the types of sheet metal forming processes and HERF

Text Books:

1. Mechanical MetalIurgy- Dieter G.E. - McGraw Hill Publications.
2. Principles of Metal Working - R.Rowe - Amold London – 1965.
3. Metals Handbook – ASM - Volume II -.ASM
4. Fundamentals of working of Metals - Sach G. - Pergamon Press.

OPERATIONS MANAGEMENT

Subject Code :18MPM22 **CIE MARKS : 40**
Number of Lecture Hours/Week :04 **SEE Marks : 60**
Total Number of Lecture Hours :50 **Exam Hours :03**

Course Objective: The student will learn to

1 Understand the concepts of Production and Operations function, role of Operations Strategy

2. Familiarize the factors affecting plant location, site selection and space requirements and to understand the types of layouts, tools and techniques for developing layouts

3. Understand the need of Forecasting and their methods and personnel Management.

4. Familiarize theSCM and Environmental Considerations in Production and Operations Management.

5. Impart knowledge on various Scheduling techniques.

MODULE- 1

Introduction to Production and Operation management: Operations Management – Need, History, System, functions. Environment of operations, Concept of productivity and its analysis, Computing productivity (Numericals)

Operations Strategy: Strategic management process, Operations/ manufacturing Strategy meaningful differentiation, Flexibility, Comparison: Traditional vs New approaches, cost leadership, Operations Strategies, Key success factors, Strengths, Weakness, Opportunities and Threats (SWOT) analysis, Five forces model, Operations Strategic action and its relationship with other, Functional areas of management, Operation Function's role: a new concept, Globalization.

MODULE- 2

Facility Location: Nature of location decision, situations that influence location decision, Case of the already established organization, location choice for the first time, Choice of a site within a region, Backward areas and industrial policy, Global location, Reasons for a foreign location, Location of facilities for service businesses, Behavioural aspects in location panning of services, Location models - ,Factor rating method, Weighted factor rating method, Load-distance method, Centre of gravity method, Break-even analysis. Locational economics (Numericals)

Plant Layout: Features, Cost, Optimization in a product/line layout, Optimization in process Layout, Assembly line balancing: Line efficiency, balance delay (Numericals)

MODULE- 3

Forecasting: Need and importance of Forecasting, Input-Output of forecasting Model, Techniques: Delphi Method, Simple and Moving average, Exponential Smoothing, Correlation and Regression Analysis, Karl Pearson's Correlation, Minimizing forecasting errors - MAD, Tracking Signal.

Personnel management in Operations Management: Personnel policy, Employment and manpower planning, Education Training and management development, Industrial relations, Health, safety and welfare.

MODULE- 4

Purchasing and Supply Chain Management (SCM): Introduction,Importance of purchasing and SCM, The procurement process, Concept oftenders, Approaches to SCM, Vendor development, Measures of purchasingand SCM, Make or buy decision, Types of buying, E-procurement.

Environmental Considerations in Production and Operations Management : productions and service operations disturb the environment, making the processes 'Green' , similarities in Operations and Environment issues, , Organizational response to environmental sustainability.

MODULE- 5

Scheduling: Priority decision rules, Johnson's Algorithm for job sequencing (n job through 2 machines, n jobs through 3 machines, n jobs through m machines and 2 jobs through m machines) Use of Gantt charts. (Numericals)

Role of Operations Management: Role of production and Operations Management in Flexible manufacturing system (FMS), Robotics, Computer integrated manufacturing (CIM), Service orientation and customer focus.

Course Outcomes: On completion of the course the student will be able to

1. Analyze the various factors of Production & Operations Management System and will be able to identify Operations Strategy of any firm
2. Analyze the various factors involved in deciding the facility, layout for a firm & analyze the evaluation and implementation of layouts.
3. Familiar with forecasting types and personnel management.
4. Understand the Purchasing and Supply Chain Management and Environmental Considerations in Production and Operations Management
5. Get awareness of different scheduling techniques and role of OM in different systems

Text Books:

1. Production and operations management-S N Chary 4th edition –Tata-Mcgraw hill New Delhi second print 2009
2. Production and operations management-Alan-muhlemann, Johnoakland, Keith lockyer.6th Edition, 1992 ELBS Pitmen publishing , London

Reference Books:

1 Modern Production / Operations Management by E.S. Buffa , 5th Ed, John Wiley & Sons.
2 Production / Operations Management by Joseph G Monks, McGraw Hill Books
3. Operations Management for Competitive Advantage, R.B.Chase, N.J.Aquilino, F. Roberts Jacob; McGraw Hill Companies Inc., Ninth Edition.
4. Supply Chain Management by Chopra and Meindl, Pearson Education, 3rd Ed.,. 2007.

NON - DESTRUCTIVE TESTING

Subject Code :18MPM23 **CIE MARKS : 40**
Number of Lecture Hours/Week :04 **SEE Marks : 60**
Total Number of Lecture Hours :50 **Exam Hours :03**

Course Objective: The student will learn to

1. Understand the role of testing and importance of non destructive testing.
2. Have consequential approach for the selection of nondestructive testing methods.
3. Know Procedures to be followed in nondestructive testing, precautions and limitations.

MODULE- 1

Magnetic Particle Inspection: Methods of generating magnetic field, types of magnetic particles and suspension liquids steps in inspection – application and limitations

MODULE- 2

Eddy Current Inspection: principles, operation variables, procedure, inspection coils, and detectable discounts by the method.

Microwave Inspection: Microwave holography, applications and limitations.

MODULE- 3

Ultrasonic Inspection: Basic equipment characteristics of ultrasonic waves, variables inspection, inspection methods pulse echo A,B,C scans transmission, resonance techniques, transducer elements couplets, search units, contact types and immersion types inspection standards-standard reference blocks.

MODULE- 4

Radiography Inspection: Principles, radiation source X-rays and gamma rays, X-ray tube, radiographic films, neutron radiography, Thermal inspection principles, equipment inspection methods applications.

MODULE- 5

Optical Holography: Basics of Holography, recording and reconstruction Acoustical Holography: systems and techniques applications. Indian standards for NDT.

Course Outcomes: On completion of the course the student will able to:

1. Handle the NDT equipments.
2. Understand the defect pattern & defect assessment.
3. Record and to present the defects after non destructive testing
4. Select the alternative methods for accessible defects and also exact defect location

Reference Books:

1. Non Destructive Testing McGonnagle JJ – Garden and reach New York.
2. Non Destructive Evolution and Quality Control volume 17 of metals hand book 9 edition Asia internal 1989.
3. The Testing instruction of Engineering materials Davis H.E Troxel G.E wiskovil C.T McGraw hill.

Professional Elective 1

QUANTITATIVE TECHNIQUES IN DECISION MAKING

Subject Code : 18MPM 241	**CIE MARKS: 40**
Number of Lecture Hours/Week : 04	**SEE Marks : 60**
Total Number of Lecture Hours : 50	**Exam Hours : 03**

Course Objective: The student will learn to

1. Why statistics are important for making managerial decisions
2. Formulate a real-world problem as a mathematical programming model
3. Understand the mathematical tools that are needed to solve optimization problems
4. Construct a project network and apply PERT and CPM techniques.
5. Illustrate how Markov chains can solve standard business problems.
6.

MODULE- I

Introduction: Statistics and managerial decisions, statistical data and Operations Research techniques.

Fundamentals of Statistics, probability and probability distributions: Measures of central tendency andlocation, Measure of dispersion, skewness and kurtosis, Probability and rules of probability, Random variablesand probability distributions - Binomial, Poisson, Hyper geometric and Normal.

MODULE- 2

Linear Programming Problem: Formulation of L.P.P., Solution of L.P.P. by graphical method, Solution of L.P.P. by simplex method, Concept of duality and solution of dual problems, Solution of L.P.P. by dual simplex method.

MODULE- 3

Transportation Problems: Structure of transportation problem finding Initial Basic feasible solution by North-West Corner method, Least-Cost Method and Vogel's Approximation method(VAM)., Optimality test of transportation problems by MODI method, Solution of degeneracy and unbalanced transportation problems, .

MODULE- 4

Theory of Games: Two person zero sum game, Minimax&maximin strategies, Solution of game by dominance rules, arithmetic and algebraic methods, Solution of game by graphical method and method of matrices, Solution of game by Linear programming approach and approximate method to solve game problems..

MODULE- 5

Network Analysis: PERT and CPM, Network construction and determination of critical path, Calculation of ES, EF, LS, LF, TF, FF and IF, Crashing of a project, Scheduling of a project and resource leveling.

Course Outcomes: On completion of the course the student will be

1. Understand the basic Statistical measures of Central Tendency and Dispersion.
2. Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry
3. Formulate a managerial decision problem into a mathematical model
4. Understand Operations Research models and apply them to real-life problems
5. Able to design new simple models, like: CPM, PERT to improve decision making and develop critical thinking and objective analysis of decision problems

Text Books:

1. Quantitative Techniques for managerial decisionsm - Srivastava U.K. - New Age International Private Limited - ISBN Number: 8122401899.
2. Operations Research - H. Taha- Prentice Hall India – 8 Edition.

Reference Books:

1. Operations Research: An Introduction - Gupta and Heera - S.Chand and Company - 2002
2. Introduction to Operations Research - Hillier and Liberman- McGraw Hill International. -ISBN 10: 0072321695.

QUALITY AND RELIABILITY ENGINEERING

Subject Code : 18MPM 242	**CIE MARKS: 40**
Number of Lecture Hours/Week : 04	**SEE Marks : 60**
Total Number of Lecture Hours : 50	**Exam Hours : 03**

MODULE- 1

Basic Concepts: Definitions of quality and Reliability, Parameters and Characteristics, Quality control, statistical Quality Control, Reliability concepts.

Concepts in Probability and Statistics : Events, Sample Space, Probability rules, Conditional probability,Dependent and Independent Events, Application of Probability concepts in Quality Control, Problems

MODULE- 2

Statistical Aspects and Probability Distributions : Statistical Tools in Quality Control, The concept of Variation,Graphical Tools for data representation and analysis, Discrete and Continuous Distributions, Normal, Poisson,Binomial, Weibull Distribution, Problems

Control Charts: Variable charts X chart, R chart, s chart, Attribute charts, P chart, NP chart, C chart.

MODULE- 3

Failure Data Analysis : Introduction, Failure Data, Quantitative measures, MTTF, MTBF, Bathtub Curve, MeanLife, Life Testing, Problems, Introduction to Failure Mode and Effect Analysis.

Acceptance Sampling: Fundamentals of acceptance sampling, types of acceptance sampling, O.C Curve, AQL,LTPD, AOQL.

MODULE- 4

System Reliability: Series, parallel and mixed configuration, Block diagram concept, r- out-of-n structure solvingproblems using mathematical models.

Maintainability and Availability: Introduction, Formulas, Techniques available to improve maintainability andavailability trade-off among reliability, maintainability and availability, Simple problems

MODULE- 5

Reliability Improvement and Allocation:Difficulty in achieving reliability, Methods for improving reliabilityduring design, Different techniques available to improve reliability, redundancy and improvement factors evaluation.

Text Books:

1.The Assurances Sciences - Halpern, Seigmund - Prentice Hall International, New Jersey, U.S.A - 1978.

2.Quality Planning and Analysis - Juran, J.M and Gryna, F.M. - Tata McGraw Hill publishing CoimpanyLtd.,New Delhi, India – 1982.

3.Logistics Engineering and Management - Blanchard, Bejamin S. - Prentice Hall International, New Jersey,U.S.A – 1986.

4.Maintainability and Reliability Handbook of Reliability Engineering and Management - Kraus, John WEditors – Ireson. W.G. and Cooms, C.F. - McGraw Hill Book Company Inc. U.S.A – 1988.

5.Concepts in Reliability Engineering - Srinathm K.S. - Affiliated East-West Press Private Limited, NewDelhi, India -1985.

TOOL ENGINEERING

Subject Code : 18MPM 243 **CIE MARKS: 40**
Number of Lecture Hours/Week : 04 **SEE Marks : 60**
Total Number of Lecture Hours : 50 **Exam Hours : 03**

Course Objective: The student will learn to

1.Acquire knowledge on cutting tool materials, tool geometry and mechanics of machining.

2.Learn intricacies involved in design of press tools and understand various tools used inpractice

3.Learnvarious gauges and measurement techniques, jigs and fixtures ,clamping methods, guiding elements

4.Acquire knowledge of various dies and moulds which helps them to analyse its suitability for variety of applications in industries

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MODULE- I

Cutting Tool Materials

Introduction and desirable properties ,Carbon and Medium-Alloy Steels ,High-Speed Steels ,Cast-Cobalt Alloys ,Carbides ,Coated Tools, Alumina-Based Ceramics ,Cubic Boron Nitride, Silicon-Nitride Based Ceramics ,Diamond ,Reinforced Tool Materials ,Cutting-Tool Reconditioning.

Design of Cutting Tools-Basic Requirements ,Mechanics and Geometry of Chip Formation , General Considerations for Metal Cutting ,Design of single point Cutting Tools , Design of Milling Cutters ,Design of Drills and Drilling , Design of Reamers, Design of Taps, Design of Inserts , Determining Shank Size for Single-point Carbide Tools,

MODULE- 2

Gauges and Gauge Design-Limits fits and tolerances, Geometrical tolerances-specification and measurement., Types of gauges ,Gauge design, gauge tolerances.

Work Holding Devices- Basic requirements of work holding devices, Location: Principles, methods and devices, Clamping : Principles, methods and devices

MODULE- 3

Drill Jigs -Definition and types of Drill Jigs ,Chip Formation in Drilling ,General Considerations in the Design of Drill Jigs, Drill Bushings ,Drill Jigs.

Design of Fixtures-Fixtures and Economics , Types of Fixtures , Milling Fixtures , Boring Fixtures , Broaching Fixtures , Lathe Fixtures.

MODULE- 4

Design of Press Tools-Introduction to press tools and related terminology, effect of clearances, theory of deformation, stages of cutting operation, center of pressure, strap strip layout , die and punch design, design of simple, compound and progressive dies, methods of mounting punches and dies, design of drawing dies, bend allowances, bending and forming dies.

MODULE- 5

Dies and moulds - Bending:Types,Parts and functions of bending die,Definition, calculations and factors affecting bend radii, bend allowance and spring back,Method to compute bending pressure,Types, sketch, working and applications of bending dies,Drawing dies-types and

method to determine blank size for drawing operation,Types, sketch, working and applications of drawing dies (embossing, curling, bulging, coining, swaging and hole flanging).

Course Outcomes: On completion of the course the student will be

1.Select cutting tool materials and tool geometries for different metal.
2.Select locating and clamping devices for given component.
3.Select and design jig and fixture for given simple component.
4.Classify and explain various press tools and press tools operations.
5.Select a die for a given simple component.

Text Books

1.JOSHI P .H, “Jigs & Fixtures”, New Delhi -Tata McGraw Hill Pub. Co. Ltd., 11th print 1999.
2.D. Eugene Ostergaard,”Basic die design”, McGraw-Hill, 1963
3.P.C. Sharma, “A Text Book Of Production Engineering”, S. Chand Publisher, 2010

Reference Books:

1. ASTME, “Fundamentals of Tool Design”, Prentice Hall of India, 1983.
2. Donaldson, “Tool Design”, Tata-McGraw Hill, 3rd Edition, 2000.
3. An Introduction to Jig & Tool Design -KEMPSTER M.H.A.- Bristol- ELBS 3rd Ed.1974.
4. Die Design Hand Book -SMITH A. DAVID.SME 3rd edition, 1990.

Professional Elective 2

SUPPLY CHAIN MANAGEMENT

Subject Code : 18MPM 251	**CIE MARKS: 40**
Number of Lecture Hours/Week : 04	**SEE Marks : 60**
Total Number of Lecture Hours : 50	**Exam Hours : 03**

Course Objective: The student will be able to:
1.Understand the basic concepts of Supply Chain Management and identify SC drivers.
2.Discuss the role of each SC drivers play and their impact on SC performance.
3.Take simple SC and analyze it using concepts of SCM.

MODULE- I

Introduction to supply chain management: Supply chain basics (Definition of SC, Objectives of SC, SC stages, SC flows, SC Examples), decision phases in a supply chain (SC Strategy or Design, SC Planning and SC Operation), supply chain efficiency and responsiveness.

Process view of a supply chain (Cycle view, Push/Pull View), Supply Chain Macro Processes in a firm, drivers of supply chain performance (Facilities, Inventory, Transportation, Information and Sourcing), Supply Chain performance: Competitive and supply chain strategies, achieving strategic fit.

MODULE- 2

Planning and Managing Inventories in a Supply Chain: Review of inventory concepts, Role of cycle inventory in a SC, Economies of scale to exploit fixed costs, Economics of scale to exploit quantity discounts, short-term discounting (Trade promotions).

Role of safety inventory in a SC, safety inventory determination, Impact of supply uncertainty, aggregation and replenishment policies on safety inventory.

MODULE- 3

Designing distribution networks in a SC : Role of distribution in the SC, factors influencing distribution network design, Design options for distribution network, E-Business and the distribution network.

Transportation in a SC: Role of Transportation in a SC, Modes of transportation and their performance characteristics, Design options for a transportation network, tailored transportation, Trade-offs in transportation design, Risk management in transportation.

MODULE- 4

Sourcing decisions in a SC: Role of sourcing in a SC, In-house and Outsource, supplier scoring & assessment, Supplier selection – Auctions and Negotiations, Contracts,Role of IT in sourcing.

Pricing and Revenue Management in a SC: Role of Pricing and Revenue Management in a supply chain, Pricing and Revenue management for Multiple customer segments, perishable assets, seasonal demand, bulk and spot contracts, Role of IT in pricing and revenue management.

MODULE- 5

Information Technology in a SC: The role of IT in a Supply Chain, The Supply Chain IT framework,CRM, ISCM, SRM, Transaction Management Foundation (TMF), Future of IT in

SC.The role of E-business in a supply chain, E-business framework, E-business in practice.Case discussion.
Co-ordination in a SC: Lack of SC Co-ordination and the Bullwhip effect, effect on performance of lack of co-ordination, Obstacles to Co-ordination in a SC. Managerial levers to achieve co-ordination,

Course Outcomes: On completion of the course the student will

1.Know the basic concepts of SCM and list out the important drivers of SC.
2.Understand the importance of SC drivers and their influence on SC performance.
3.Able to apply the concepts of SCM on simple real time SC's.

Text Books:

1. Supply Chain Management – Strategy, Planning & Operation. Sunil Chopra & Peter Meindl; PearsonEducation Asia, ISBN: 9788120331587

Reference Books:

1. Supply Chain Redesign – Transforming Supply Chains into Integrated Value Systems -Robert B
Handfield, Ernest L Nichols - Jr., 2002, Pearson Education Inc, ISBN: 81-297-0113-8
3. Modelling the Supply Chain -Jeremy F Shapiro, Duxbury -Thomson Learning -2002, ISBN 0-534-37363.
4. Designing & Managing the Supply Chain -David Simchi Levi, Philip Kaminsky& Edith Simchi Levi -McGraw Hill.

HUMAN RESOURCE MANAGEMENT

Sub Code :18 MEM232 **CIE MARKS : 40**
Number of Lecture Hours/Week :04 **SEE Marks : 60**
Total Number of Lecture Hours :50 **Exam Hours :03**

MODULE 1
Introduction to Human Resources: Importance of Human Resources – Human Resource Planning, Job Analysis and Methods.
Recruitment – Recruiting Sources: Recruiting Efforts with possible constraint – ability to attract incumbents.

MODULE 2
The Selection Process: Cost of Selection – Discrete Selection Process – The Comprehensive Approach – Key Elements in successful Predictors – Selection Devices – Employment Tests and Interviews
Employee Training: Determination of Training Needs and Priorities – Formal Employee Training Methods – Methods for Training Managers.

MODULE 3
Career Development: Value of Effective Career Development – External versus Internal Dimensions to a career – Career Stages.
Motivating the Employees: Different Theories and Approaches to work Motivation – Job Design.Work scheduling and Motivation – Performance Appraisals – Rewarding the Productive Employee.

MODULE 4
Compensating the Work Force: Compensation Administration – Factors influencing the Compensation Administration – Job Evaluation and Pay Structure – Incentive Compensation Plans – Benefits and Services.

MODULE 5
Maintaining the Work Force: Labor Relations – some Legislation governing Labor Relations – Safety and Health of Workers – Combating Stress and Burnout Problems – Employee Discipline – disciplinary Actions – collective bargaining process.

REFERENCE BOOKS:
1. Principles of personnel management – Flippo – McGraw Hill.
2. Personnel principles and policies for modern manpower – Yoder Prentice Hall India.
3. Personnel/Human Resource Management – Terry Leap & Michael Crinocollier Macmillan publishers.
4. Personnel and Human Resource Management – Memoria Himalaya publishing Company.

ADVANCED JOINING PROCESSES

Subject Code 18MPM 253	**CIEMARKS :40**
Number of Lecture Hours/Week :04	**SEE Marks : 60**
Total Number of Lecture Hours :50	**Exam Hours :03**

Course Objectives: The student will learn to

1. Impart knowledge regarding various advanced welding practices in industries.
2. Understand the various parameters and requirements for welding processes.
3. Understand the various methods of welding inspection.
4. Know the comparative merits and demerits of various welding processes.
5. Understand the right kind of welding technique suitable for various joints.
6. Learn the joint designs adopted in different types of welding techniques

MODULE- 1

Welding Distortion: Introduction, Distortion and residual stresses, concept of distortion, types of distortion, Control of welding distortion, minimizing distortion in repair work, Effect of metal properties on welding distortion, Calculation of shrinkage.

Welding processes: Electro Slag Welding, Electron Beam Welding, Plasma arc Welding, Laser Beam Welding, Explosion Welding, Diffusion Welding, Ultrasonic Welding, Friction welding and Thermit welding.

MODULE- 2

Welding of Dissimilar Metals: Introduction, Concept and metallurgical problems in dissimilar metals welding, techniques for welding dissimilar metals, welding various dissimilar metals combination.

Welding of Plastics: Introduction, Principle of welding plastics, common weldable plastics, weld joint design, surface preparation, Plastics welding processes such as Heated tool welding, Hot gas welding, High frequency welding, Ultrasonic welding and Friction welding with their principle of operation, Equipment required, Advantages, Disadvantages and Application.

MODULE- 3

Welding Symbols: Need for, representing the welds, Basic weld symbols, Location of Weld, Supplementary symbols, Dimensions of welds, Examples

Welding Design: Introduction, Principles of sound welding design, Welding joint design Welding positions, Allowable strengths of welds, under steady loads.Allowable fatigue strength of weld. Design of weld subjected to combined stresses. Weld throat thickness, solved and Unsolved Examples

MODULE- 4

Inspection of Welds: Destructive techniques like Tensile, Bend, and Nick break, Impact & Hardness. Non-Destructive techniques like 'X' rays, Ultrasonic, Magnetic particle, Dye Penetrate, Gamma ray inspection.

Quality Control in Welding: Introduction, Quality assurance v/s Quality control, Weld quality, Discontinuities in welds, their causes and remedies and Quality conflicts.

MODULE- 5

Computer-Aided Welding Design: Introduction, welding analysis, Engineering design v/s welding design, perspectives in welding design, solution to the welding design problems.

Computer-Aided Welding Analysis: Computer-aided welding analysis, computer-aided welding design, use of interactive computer graphics, cautions and conclusions.

Course Outcomes:On completion of the course the student will be able to

1. Introduce the various advanced welding techniques which make them interested to choose a career in the field of welding.
2. Understand the advanced welding practices in Industries and their comparative merits and demerits.
3. Select the right kind of welding techniques for joining raw materials of various thicknesses.
4. Select appropriate welding technique suitable for joining various types of metals.

Reference Books:

1. Welding Technology - O.P. Khanna
2. Welding Engineering - Rossi - McGraw Hill.
3. Advanced Welding processes – Nikodaco&Shansky - MIR Publications.
4. Welding Engineering Handbook - A.W.S.
5. Welding for Engineers - Udin, Funk &Wulf

LABORATORY

Subject Code 18MPML26 **CIEMARKS :40**
Number of Lecture Hours/Week :04 **SEE Marks : 60**
Total Number of Lecture Hours :50 **Exam Hours :03**

List of Experiments

1. Determination of Chip reduction co-efficient (reciprocal of chip thickness ratio) during single point turning.
2. Forces measurements during orthogonal turning
3. Estimation of Power required during orthogonal turning
4. Torque and Thrust measurement during drilling
5. Roughness determination for machined surfaces and its influence of tool geometry and feed rate.
6. Study of capstan lathe and its tooling and prepare a tool layout & job as per given drawing
7. Study the principle & construction of the Metallurgical Microscope and prepare metallic samples for metallographic examination
8. Study of Microstructure and Hardening of steel in different medium and cooling rates
9. Effect of Carbon percentage on the hardness of Steel.
10. Determination of wear and coefficient of friction for the given specimen using pin on disc tester
11. Study and use of Magnetic crack detector.
12. Study of Impact test on Steel by using Izod&Charpy test.

SEMESTER III
TOTAL QUALITY MANAGEMENT

Subject Code 18MPM31	**CIEMARKS :40**
Number of Lecture Hours/Week :04	**SEE Marks : 60**
Total Number of Lecture Hours :50	**Exam Hours :03**

Course Objective: The student will learn to

1. Understand the philosophy and core values of Total Quality Management (TQM).
2. Determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization.
3. Apply and evaluate best practices for the attainment of total quality.

MODULE- 1

Principles And Practice: Definition of TQM , basic approach, Obstacles to TQM, TQM Framework, benefits of TQM

Business Evolution: Customer Satisfaction, four fitness of Customer Satisfaction, Evolution of Customer Satisfaction Methodology, Leadership vs Empowerment, Four Practical Revolutions in Management thinking , Four Levels of Practice.

MODULE- 2

Customer Focus: Change in the Work Concept: Market-in, Philosophy-in and Philosophy-out, Evolution of Customer Focus and Its Challenges, Three Stages of Customer Focus, Customer Concerns, Integration of Concerns, Individualizing Customers

MODULE- 3

Continuous Improvement: Management by process, WV Model of Continuous Improvement, Three types of improvements, Continuous Improvement of Processes for All Types of Work, Continuous Improvement verses breakthrough, Continuous Improvement and the Scientific Method.

MODULE- 4

Managing Existing Processes: Process Discovery and Management: Thinking In Terms of Process, Process Discovery, steps of Process Discovery, benefits of Process Discovery. The 7 QC Tools.

Proactive Improvement: Proactive Improvement concept, Kawakita's Five Principles, Language Data and Use of Semantics, Comparison of Affective and Report language, Five principles of Customer Visitation, The purpose of Proactive Improvement to Develop New Products.

MODULE- 5

Total Participation: Employee Involvement – Motivation, employee surveys, empowerment, teams, suggestion system, recognition and reward, gain sharing, performance appraisal, unions and employee involvement, three sets of skills of leader ship. QC Circles.

InititationStragiesAnd Mobilization : CEO involvement and the importance of CEO, A General Model for Mobilization, Hoshin Management, Hoshin Management and Its Parts,

Proactive , Reactive, and Control phases in Management

Course Outcomes: On completion of the course the student will be able to

1. Learn the principles and practices of TQM.
2. Know the evolution and challenges made in industries by TQM.
3. Understand the models to solve the problems and improving the circumstances.
4. Learn the quality tools implemented in industries and its performances
5. Know the involvement of employees and the changes by management.

Text Books:

1. Four Practical Revolutions in Management: systems for creating unique organizational capability" -Shoji Shiba and David Walden,– Productivity Press &Center for Quality Management, (USA) , 2001, Special Indian Edition,ISBN-9781563273889/9781563272172/ 9781563272318
2. "Total Quality Management"- *Besterfield*, Pearson Education, 2011. ISBN, 817758412X, 9788177584127

Reference Books:

1. "Management for Total Quality" -N Logothetis- Prentice Hall of India, New Delhi, 2003, ISBN-81-203-1137-X
2. "Total Quality Management"-H D Ramachandra and K R Phanesh-2006 edition.

Professional Elective 3

RAPID PROTOTYPING

Subject Code:18MPM321	**CIEMARKS :40**
Number of Lecture Hours/Week :04	**SEE Marks : 60**
Total Number of Lecture Hours :50	**Exam Hours :03**

MODULE 1

Introduction: Need for the compression in product development, history of RP systems, Survey of applications, Growth of RP industry, and classification of RP systems.

Stereo Lithography Systems: Principle, Process parameter, Process details, Data preparation, data files and machine details, Application.

MODULE 2

Selective Laser Sintering and Fusion Deposition Modeling: Type of machine, Principle of operation, process parameters, Data preparation for SLS, Applications, Principle of Fusion deposition modeling, Process parameter, Path generation, Applications.

Solid Ground Curing: Principle of operation, Machine details, Applications.

MODULE 3

Laminated Object Manufacturing: Principle of operation, LOM materials. Process details, application.

Concepts Modelers: Principle, Thermal jet printer, Sander's model market, 3-D printer. GenisysXs printer HP system 5, object Quadra systems.

MODULE 4

Rapid Tooling: Indirect Rapid tooling -Silicone rubber tooling –Aluminum filled epoxy tooling Spray metal tooling, Cast kirksite, 3Q keltool, etc. Direct Rapid Tooling Direct. AIM, Quick cast process, Copper polyamide, Rapid Tool, DMILS, Prometal, Sand casting tooling, Laminate tooling soft Tooling vs. hard tooling.

MODULE 5

RP Process Optimization: factors influencing accuracy. Data preparation errors, Part building errors, Error in finishing, influence of build orientation.

TEXT BOOKS:

1. Stereo lithography and other RP & M Technologies - Paul F. Jacobs - SME, NY 1996.
2. Rapid Manufacturing - Flham D.T &Dinjoy S.S - Verlog London 2001.
3. Rapid automated - Lament wood - Indus press New York

Reference Books: 1. Wohler's Report 2000 - Terry Wohlers - Wohler's Association - 2000.

ADVANCED FLUID POWER SYSTEMS

Subject Code 18MPM322	**CIEMARKS :40**
Number of Lecture Hours/Week :04	**SEE Marks : 60**
Total Number of Lecture Hours :50	**Exam Hours :03**

Course Objective: The course objective is to make students to familiarize:

1. The advantages and applications of Fluid Power Engineering and Power Transmission System.
2. The Applications of Fluid Power System in automation of Machine Tools and others Equipments.

MODULE- 1

Fluid Power Systems And Fundamentals: Introduction to fluid power system Review of Pascal's law and its applications in Fluid Power Systems, Structure of Hydraulic control system, Advantages and disadvantages of fluid power & its applications.

The Source of Hydraulic Power: Hydraulic Pumps, pumping theory, pump classification, Gear pumps, Vane pumps, piston pumps, variable displacement pumps, pump performance and pump selection.

MODULE- 2

Hydraulic Actuators: Linear Hydraulic Actuators (cylinder),Cylinder mountings, Cylinder Force,Velocity and Power, Cylinder loading through mechanical linkages, Hydraulic Cylinder cushions, hydraulic Rotary Actuators, Gear motors, vane motors, piston motors, Hydraulic theoretical torque , power and flow rate

Control components in Hydraulic Systems:

i) Directional Control Valves – Classification, 2/2, 3/2,4/2 & 4/3 ways DCV's, Different Centre configurations in 4/3 way valves, actuation of DCV's, Indirect actuation, Valve Lap – Lap during Stationary and during switching.

ii) Pressure Control Valves: Classification, opening & Closing Pressure difference, Cracking Pressure, Pressure Relief Valve – Simple & Compound type, iii) Flow Control valves – Fixed throttle, Variable throttle, Pressure Compensation principles

iv) Check valve, Pilot operated check valve.

MODULE- 3

Hydraulic Circuit Design & Analysis:Control of single and double –acting hydraulic cylinder, regenerative circuit, pump unloading circuit, Double pump hydraulic system, Counter Balance valve application, Hydraulic cylinder sequencing circuits. Locked cylinder using pilot check valve, Cylinder synchronizing circuits, Speed control of hydraulic cylinder, Speed control of hydraulic motors, Accumulators and accumulator circuits.

MODULE- 4

Introduction to Pneumatic Control: Production of compressed air- Compressors, Preparation of compressed air –Driers, Filters, Regulators, Lubricators. Structure of Pneumatic control system. Pneumatic Actuators: Linear cylinders-types, end position

cushioning, Rod-less cylinders, working advantages. Cylinder performance.Rotary actuator types, construction and application.
Pneumatic Valve: Directional control valves, impulse valve, Quick exhaust valve, shuttle valve, Twin pressure valve, Time delay valve.

MODULE- 5
Pneumatic Circuit & Logic Circuits:- Control of single and double acting cylinder, impulse operation, speed control, sequencing, Pneumatic Vacuum system AND,OR, NOT, NAND, NOR, YES Function, Logic circuits design using shuttle valve & twin pressure valve, Binary Arithmetic, logic &Boolean Algebra, use of kannaughveitch map for pneumatic circuit design.

Course Outcomes: After studying this course students will be able to:
1. Explain the working principle and performance parameters of various hydraulic and pneumatic components and systems.
2. Design hydraulic and pneumatic circuits for mechanical engineering applications.
3. Analyze performance evaluation of fluid power systems and propose improvements.

Text Books:
1. Fluid power with applications, Anthony Esposito, Seventh edition, Pearson education, Inc, 2008.
2. Pneumatic systems, S.R.Majumadar, Tata McGraw Hill Publishing Co., 2001.

Reference Books:
1. Oil Hydraulic systems – principles and maintenance, S.R. Majumdar, Tata McGraw Hill publishing company Ltd., 2003.
2. Pneumatics and Hydraulics, Andrew Parr. Jaico publishing Co., 2006.
3. Components & Application - Bosch Rexroth didactic - Hydraulics Trainer - Vol 1. Publication.
4. Pneumatics: Theory and Applications- Bosch Rexroth didactic – Publication.
5. Electro Pneumatics- Bosch Rexroth didactic - Vol. 2, Publication.

SURFACE TREATMENT AND FINISHING

Subject Code 18MPM323 **CIEMARKS :40**
Number of Lecture Hours/Week :04 **SEE Marks : 60**
Total Number of Lecture Hours :50 **Exam Hours :03**

MODULE- 1

Fundamentals of Electro plating: Galvanizing, Hot dip metal coating, thin coating, thin coating, chromium plating, Nickel plating.

MODULE- 2

Vacuum coating, FVD & CVD metal spraying - Methods, surface preparation, mechanical. Properties of sprayed metals, plasma coating.

MODULE- 3

Plastic coating of metal - PVC coating Spherodising process details, phosphate coating - mechanism of formation.

MODULE- 4

Heat treatment methods: Annealing, Normalizing, Tempering, Case hardening methods, flame hardening sub zero treatment.

MODULE- 5

Heat treatment methods for gears, spindles, cutting tools.

Advanced coating technologies: Hard facing, electro deposition technique, coating characterization.

REFERENCE BOOKS:

1. Surface preparations & finishes for Metals - James A Murphy - McGraw Hill.
2. Principles of metal surface treatment and protection - Pergamon Press Gabe, David Russell - Description, Oxford ; New York - 2d ed., 1978
3. Handbook of metal treatment and testing - John wiley& sons.
4. Heat Treatment of Metals – Zakrov - MlR Publications.
5. Metal Hand Book –ASM.

Professional Elective 4

SIMULATION AND MODELING OF MANUFACTURING SYSTEMS

Subject Code 18MPM331	**CIEMARKS :40**
Number of Lecture Hours/Week :04	**SEE Marks : 60**
Total Number of Lecture Hours :50	**Exam Hours :03**

Course Objective: The student will learn to

1. Define the basics of simulation modeling and replicating the practical situations in organizations
2. Generate random numbers and random variants using different techniques.
3. Develop simulation model using heuristic methods.
4. Analyze s of Simulation models using input analyzer, and output analyzer.
5. Explain Verification and Validation of simulation model.

MODULE- 1

Principle of Computer Modelling and Simulation: Monte Carlo simulation. Nature of computer- modelling and simulation.Limitations of simulation, areas of applications.

System and Environment: Components of a system -discrete and continuous systems, Models of a system -a variety of modelling approaches.

MODULE- 2

Discrete Event Simulation: Concepts in discrete event simulation, manual simulation using event scheduling, single channel queue, too server queue, simulation of inventory problem.

Statistical Models in Simulation: Discrete distributions, continuous distributions.

MODULE- 3

Random Number Generation: Techniques for generating random numbers- Mid square method -the mod product method -Constant multiplier technique -Additive congruential method –Linear congruential method -Tests for random numbers -The Kolmogorov-Smimov test -the Chi-square test. IvicaCmkovic, Ulfaskluna and AnnitaborsenDohlgvist Publisher Artechhouse.

MODULE- 4

Random Variable Generation: Inversion transforms technique-exponential distribution. Uniform distribution, weibul distribution, continuous distribution, generating approximate normal variates-Erlang distribution.

Empirical Discrete Distribution: Discrete uniform -distribution poisson distribution - geometric distribution - acceptance -rejection technique for Poisson distribution gamma distribution.

MODULE- 5

Design and Evaluation of Simulation Experiments: variance reduction techniques - antithetic variables, variablesverification and validation of simulation models. **Simulation Software:** Selection of simulation software, simulation packages.

Course Outcomes: After successful completion of the course, the students will be able to:

1. Describe the role of important elements of discrete event simulation and modeling paradigm.
2. Conceptualize real world situations related to systems development decisions, originating from source requirements and goals.
3. Develop skills to apply simulation software to construct and execute goal-driven system models.
4. Interpret the model and apply the results to resolve critical issues in a real world environment.

Text Books:

2. Discrete Event System Simulation - Jerry Banks & .John S Carson II - Prentice Hall Inc.-1984.
3. Systems Simulation - Gordan. G. - Prentice Hall India Ltd - 1991.

Reference Books:

1. System Simulation with Digital Computer - NusingDeo - Prentice Hall of India - 1979.
2. Computer Simulation and Modeling- Francis Neelamkovil - John Wilely& Sons - 1987.
3. Simulation Modeling with Pascal - RathM.Davis& Robert M O Keefe - Prentice Hall Inc. - 1989.

ADVANCED FOUNDRY TECHNOLOGY

Subject Code 18MPM242	**CIEMARKS :40**
Number of Lecture Hours/Week :04	**SEE Marks : 60**
Total Number of Lecture Hours :50	**Exam Hours :03**

Course Objective: The student will learn

1. Solidification process, Gates and Risers
2. Concepts of casting design and casting defects
3. Understand constructional features and working of different foundry furnaces
4. Understand Ferrous and Aluminum metals and alloys.
5. Foundry Mechanization and Modernization.

MODULE- 1

Solidification Of Casting: Concept of solidification of metals. Homogenous and heterogeneous nucleation.Growth mechanism.Solidification of pure metals and alloys.Mechanism of columnar and dendritic growth.Coring or Segregation.Concept of progressive and directional solidifications.

Principles Of Casting And Risering: Design of the gating System. Different types of gates. Gating ratio and its functions.Definition and functions of the riser.Types of risers and their application.Design of the riser - its shape.Size and location.

MODULE- 2

Design Of Casting: Factors to be considered in casting design. Design consideration in pattern making, moulding techniques and core making and assembly. Cooling stresses and hot spots in casting and modification in casting geometry to overcome them.

Casting Quality Control: Casting defects and factors responsible for them.Different inspection and testing methods to evaluate the casting.Quality control activities in a foundry.Salvaging methods of defective casting.

MODULE- 3

Furnace Technology: Melting furnace design, Heat sources, developments, melting conditions, losses, special melt treatments, melt temperature. Pouring equipments and techniques, special pouring techniques, Ladle heating and insulation.Study of various furnaces used in foundry, construction and operation of crucible and hearth furnaces. Resistance, Arc and Induction furnaces-their construction.Operation and application.

MODULE- 4

Steel Casting Practice: Common steel casting, their composition, structure and properties. Melting and refining of steel. Gating and risering of steel castings cleaning of steel castings.

Aluminium Foundry Practice: Composition, properties and application of common aluminum alloy casting. Melting and casting of AI-alloys. Gating and risering of AI-alloy casting.

MODULE- 5

Foundry Mechanization And Modernization: Introduction to modernization. Mechanization of foundry and its advantages.Mechanization of sand plant, moulding and

core making mechanization in melting, pouring and shakeout units.Material handling equipments and conveyor systems.Captive and mechanized foundries.

Course Outcomes: On completion of the course the student will be able to

1. Understand the Solidification process, Gates and Risers types and design
2. Design simple casting design and learn casting defects
3. Understand constructional features and working of different foundry furnaces
4. Understand Ferrous and Aluminum metals and alloys
5. Understand Foundry Mechanization and Modernization

Reference Books:

1. Principle of metal casting - Heine, et. al - Tata-McGraw-HiII Publication - 2003.
2. A test book of FoundryTechnology - Lal, M. Khanna, P.O - DhanpatRai& Sons Publication.
3. Foundry Technology – PeeterBeelely, – Butterworth.

PROJECT MANAGEMENT

Sub Code: 18 MPM333 **CIEMARKS :40**
Number of Lecture Hours/Week :04 **SEE Marks : 60**
Total Number of Lecture Hours :50 **Exam Hours :03**

MODULE 1
Introduction: Identification of Investment Opportunities, Market and Demand Analysis – Technical Analysis -Investment Outlay.

MODULE 2
Means of Financing-Profitability and Breakeven Analysis -Cash Flows of Projects -Tax factor in investment Analysis -Interest Compounding and Discounting.

MODULE3
Appraisal Criteria and Selection of Investment-cost of capital analysis of Risk -Financial Projection, social Cost Benefit Analysis

MODULE 4
Manpower Management in Projects-Functional Approach to Manpower Management, - the Element of decision Process Project Team Concepts - Field Autonomy- Policies Governing Projects.
MODULE 5
Networks Techniques in Project Management-*PERT/CPM* Analysis - Administrative aspects of Capital Investment.

REFERENCE BOOKS:
1. Projects - appraisal, preparation, budgeting and implementation – Prasannachandra - Tata MCgraw hill.
2. Handbook of Project Management - Dennis lock.
3. Project Management - Dennis lock - Gower Publishing Ltd - 8th Revised edition.