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Mechanical Engineering Department

III-SEM M.E. APS	Subject Code	Subject Name / Title	Maximum Marks Allotted					Contract Hrs. per weeks			Total Credits
			Theory			Practical					
			End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work	L	T	P	
	APS-1131 (A)	Supply Chain Management	70	20	10	-	-	3	1	-	4

UNIT-I
Introduction: Logistics, Concepts, Definitions, approaches, factors affecting logistics. Supply chain, basic tasks of the supply chain, the new corporate model

UNIT-II
Supply Chain Management: The new   paradigm, the modular company, the network relations, supply process, Procurement process, Distribution management.

UNIT-III
Evolution of Supply Chain Models: Strategy and structure, factors of supply chain, Manufacturing strategy stages, supply chain progress, model for competing through· supply chain management, PLC grid, supply chain redesign, Linking supply chain with customer.

UNIT-IV
Supply Chain Activity Systems: Structuring the SC, SC and new product, functional r les in SC, SC design frame-work, collaborative product commerce (CPC).

UNIT-V
SCM Organization and Information System: The management task, logistics organization, the logistics information S)':Stems, Topology of SC application, MRP, ERP, Warehouse management system, product data management, cases.

BOOKS RECOMMENDED

1. Scharj, P.B. Lasen, TS, "Managing the global supply chain", Viva books, New Delhi
2. Ayers, J.B. "Hand book of supply chain management", The St. Lencie press, 2000.
3. Nicolas, J.N. "Competitive manufacturing management-continuous improvement", Lean production, and customer focused quality, McGraw-Hill, NY, 1998.
4. Steudel, IIJ: and Desruelle, P, "Manufacturing in the ninetees-How to become a mean, lean and world class competitor", Van Nostrand Reinhold: NY, 1992.

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III-SEM M.E. APS	Subject Code	Subject Name / Title	Maximum Marks Allotted					Contract Hrs. per weeks			Total Credits
			Theory			Practical					
			End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work	L	T	P	
	APS-1131 (B)	Tool Engineering & Design	70	20	10	-	-	3	1	-	4

UNIT-I

Introduction to manufacturing processes, objectives, organization and role of tool engineering, role of materials in tooling

UNIT-II

Tooling for material removal process like traditional machining processes, nontraditional machining processes automats and NC and CNC machines.

UNIT-III

Tooling for forming processes.

UNIT-IV

Tooling for casting and metal joining processes, molding and pattern design mechanization of foundries
Design· of welding fixtures, tooling· for mechanical joining processes.

UNIT-V

Tooling for inspection and gauging, design and manufacturing of gauges, CMM, CAD in tool design.

BOOKS RECOMMENDED

1. Hoffman E.G."Fundamentals of tool design", SME, 1984.
2. Kalpakjian S. "Manufacturing Engineering and Technology", Addision Wesley, 1995
3. HMT "Profduction Technology", Tata McGraw Hill, 1991

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III-SEM M.E. APS	Subject Code	Subject Name / Title	Maximum Marks Allotted					Contract Hrs. per weeks			Total Credits
			Theory			Practical					
			End Sem	Mid Sem MST	Quiz Assign ment	End Sem	Lab Work	L	T	P	
APS-1131 (C)	Robotics		70	20	10	-	-	3	1	-	4

UNIT-I
Introduction: Robotics-classification, Sensors-Position sensors, Velocity sensors, Proximity sensors, Touch and Slip Sensors, Force and Torque sensors. Grippers and Manipulators-Gripper joints, Gripper force, Serial manipulator, Parallel Manipulator, selection of Robot-Selection based on the Application

UNIT-II
Kinematics: Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix, Direct and Inverse Kinematics for industrial robots for Position and orientation.
Statics & dynamics: Differential Kinematics and static- Dynamics-Lagrangian Formulation, Newton Euler Formulation for RR & RP Manipulators,

UNIT-III
Trajectory planning: Motion Control- Interaction control, Rigid Body mechanics.
Control: architecture- position, path velocity and force control systems, computed torque control, Adaptive control, and Servo system for robot control.

UNIT-IV
Robot programming: Programming of Robots and Vision System- overview of various programming Languages.

UNIT-V
Applications: Application of Robots in production systems- Application of robot in welding, machine tools, material handling, and assembly operations parts sorting and parts inspection.

BOOKS RECOMMENDED

1. Craig, J.J., *Introduction to Robotics Mechanics and Control*, AddisonWesley, 1999.

2. Saha, Subir Kumar. Introduction to robotics. Tata McGraw-Hill Education, 2014.

3. Spong, Mark W., Seth Hutchinson, and Mathukumalli Vidyasagar. Robot modeling and control. Vol. 3. New York: Wiley, 2006.

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III-SEM M.E. APS	Subject Code	Subject Name / Title	Maximum Marks Allotted					Contract Hrs. per weeks			Total Credits
			Theory			Practical					
			End Sem	Mid Sem MST	Quiz Assign ment	End Sem	Lab Work	L	T	P	
	APS-1132 (A)	Operations Management	70	20	10	-	-	3	1	-	4

UNIT-I

Production system design and control, Types of production system, Production & Operation functions, Product design and development, product standardization · and simplification, concurrent engineering implementation, advantages and limitations.

UNIT-II

Production planning and control, Capacity requirement planning, Material requirement planning, production routing, Scheduling, Dispatching, Process planning, Computer Aided Process Planning (CAPP), ERP.

UNIT-III

Facility location and layout; Factor affecting layout selection and analysis inventory control and its function, Purchasing principle and procedures, storage procedures, stock verification.

UNIT-IV

Production system, management: Just-in-time (JIT), supply chain management, Business process re-engineering (BPR), Lean Manufacturing.

UNIT-V

Quality management: Techniques of statistical Quality· control, Inspection and sampling, Total quality management, Principles, Aims and objectives of Personnel management.

BOOKS RECOMMENDED

1. Krishnamurthy, "Production and Operation Management" PHI
2. Adam & Ebert, P.O.M./P.H.I.
3. K.C. Jain, "Production Planning and Control "Khanna.

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III-SEM M.E. APS	Subject Code	Subject Name / Title	Maximum Marks Allotted					Contract Hrs. per weeks			Total Credits
			Theory			Practical					
			End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work	L	T	P	
	APS-1132 (B)	Advanced Optimisation Techniques	70	20	10	-	-	3	1	-	4

UNIT-I

Introduction, Classification of optimization problems, Applications of optimization, concepts of design vector, Design constraints, constrain surface, objective function surfaces and multilevel optimization.

UNIT-II

Karmakar's method of solving L.P. problems, Quadratic programming, nonlinear programming,· unconstrained optimization techniques, Basics of constrained optimization.

UNIT-III

Integer linear programming methods and applications, Introduction to integer non-linear programming, Basics of geometric programming

UNIT-IV

Multi-objective . optimization methods and applications, Formulation of problems, Separable programming and-stochastic programming

UNIT-V

Introduction to Genetic algorithms, Simulated Annealing, neural network based optimization and optimization of fuzzy systems.

BOOKS RECOMMENDED

1. Kalyanmoy Deb, "Optimization for Engineering design- algorithms and examples" PHI, New Delhi, 1995.
2. Singiresu S. Rao. "Engineering optimization' – Theory and practices", John Weley and Sons, 1998.
3. Garfinkel, R.S. and Nemhauser, G.L. "Integer programming", Jonh Wiley & Sons, 1972.

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III-SEM M.E. APS	Subject Code	Subject Name / Title	Maximum Marks Allotted					Contract Hrs. per weeks			Total Credits
			Theory			Practical					
			End Sem	Mid Sem MST	Quiz Assign ment	End Sem	Lab Work	L	T	P	
	APS-1132 (C)	Micro & Nano Manufacturing	70	20	10	-	-	3	1	-	4

UNIT I:
Introduction: Importance of Nano-technology, Emergence of Nanotechnology, Bottom-up and Top-down approaches, challenges in Nanotechnology.

UNIT II:
Nano materials Synthesis and Processing: Methods for creating Nanostructures; Processes for producing ultra-fine powders - Mechanical grinding; Wet Chemical Synthesis of nanomaterials - sol-gel process, Liquid solid reactions; Gas Phase synthesis of nanomaterials- Furnace, Flame assisted ultrasonic spray pyrolysis; Gas Condensation Processing GPC), Chemical Vapour Condensation (CVC)- Cold Plasma Methods, Laser ablation, Vapour - liquid -solid growth, particle precipitation aided CVD, summary of Gas CondensationProcessing (GPC).

UNIT III:
Structural Characterization: X-ray diffraction, Small angle X-ray Scattering, Optical Microscope and their description, Scanning Electron Microscopy (SEM), Scanning Probe Microscopy (SPM), TEM and EDAX analysis, Scanning Tunneling Microscopy (STM), Atomic force Microscopy (AFM).

UNIT IV:
Microfabrication Techniques: Lithography, Thin Film Deposition and Doping, Etching and Substrate Removal, Substrate Bonding. MEMS Fabrication Techniques, Bulk Micromachining: Processes used for shaping and sizing of microproducts and macro products and Nano finishing techniques , Surface Micromachining, High-Aspect-Ratio Micromachining.

UNIT V:
MEMS devices and applications: Pressure sensor, inertial sensor, Optical MEMS and RFMEMS, Micro-actuators for dual-stage servo systems.

BOOKS RECOMMENDED

1. Tai-Ran Hsu, "MEMS and Microsystems: Design and Manufacture," McGraw- Hill, 2008.
2. V. K. Jain, "Introduction to Micromachining", 2nd Edition, Alpha Science, 2014.
3. Mark James Jackson, "Microfabrication and Nanomanufacturing", CRC Press, 2005.
4. Gabor L. Hornyak, H.F.Tibbals, Joydeep Dutta & John J Moore, "Introduction Nanotechnology", CRC Press, 2009.
5. Ray F. Edgerton, "Physical Principles of Electron Microscopy: An Introduction AEM", Springer, 2005.
6. B.D. Cullity, "Elements of X-Ray Diffraction", 3 rd Edition, Prentice Hall, 2002

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