

Elective-I (Group A)

Written by Administrator
Sunday, 01 November 2009 11:03 -

ELECTIVE-I (GROUP A)

THEORY OF ELASTICITY

Subject Code

:

06ME661

IA Marks

:

25

No. of Lecture Hrs./ Week

:

04

Exam Hours

Elective-I (Group A)

Written by Administrator
Sunday, 01 November 2009 11:03 -

:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

PART - A

Unit - 1

Elective-I (Group A)

Written by Administrator
Sunday, 01 November 2009 11:03 -

Definition and notation: Stress, Stress at a Point, Equilibrium Equations, Principal Stresses, Mohr's Diagram, Maximum Shear Stress, Boundary Conditions.

6 Hours

Unit - 2

Strain at a point: Compatibility Equations, Principal Strains, Generalised Hooke's law, Methods of Solution of Elasticity Problems – Plane Stress-Plane Strain Problems.

8 Hours

Unit - 3

Two dimensional problems: Cartesian co-ordinates – Airy's stress functions – Investigation of Airy's Stress function for simple beam problems – Bending of a narrow cantilever beam of rectangular cross section under edge load – method of Fourier analysis – pin ended beam under uniform pressure.

7 Hours

Unit - 4

General equations in cylindrical co-ordinates: Thick cylinder under uniform internal and / or external pressure, shrink and force fit, stress concentration.

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6 Hours

PART - B

Unit - 5

Stresses in an infinite plate (with a circular hole) subjected to uniaxial and biaxial loads, stress concentration, stresses in rotating discs and cylinders.

6 Hours

Unit - 6

Torsion of circular, elliptical and triangular bars: membrane analogy, torsion of thin open sections and thin tubes.

6 Hours

Unit - 7

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Thermal stresses: Thermo elastic stress strain relationship, Equations of equilibrium Thermal stresses in thin circular discs and in long circular cylinder, sphere.

7 Hours

Unit - 8

Uniqueness theorem: Principle of super position, reciprocal theorem, saint venant principle.

6 Hours

Text Books:

1. **Advanced Mechanics of solids**, L. S. Srinath, Tata Mc. Graw Hill, 2003
2. **Theory of Elasticity:** S. P. Timoshenko and J. N Gordier, Mc. Graw Hill International, 3rd edition, 1972

References Books:

1. **Theory of Elasticity:** Dr. Sadhu Singh, Khanna Publications, 1988
2. **Elasticity, Theory, Applications & Numericals:** Martin H Sadd, Elsevier. 2005
3. **Applied Elasticity**, Seetharamu & Govindaraju, Interline Publishing
4. **Applied Elasticity**, C.T. WANG Sc. D. Mc. Graw Hill Book Co. 1953

Elective-I (Group A)

Written by Administrator
Sunday, 01 November 2009 11:03 -

MECHANICS OF COMPOSITE MATERIALS

Subject Code

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06ME662

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25

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PART - A

UNIT - 1

Elective-I (Group A)

Written by Administrator
Sunday, 01 November 2009 11:03 -

Introduction to composite Materials: Definition, classification and characteristics of composite Materials – fibrous composites, laminated composites, particulate composites. Introduction to shape memory alloys.

6 Hours

UNIT - 2

Fiber Reinforced Plastic Processing: Lay up and curing, fabricating process, open and closed mould process, hand lay up techniques; structural laminate bag molding, production procedures for bag molding; filament winding, pultrusion, pulforming, thermo-forming, injection molding, blow molding.

8 Hours

UNIT - 3

Applications and Mechanics of Fiber Reinforced Plastics: Automobile, Aircrafts, missiles, Space hardware, Electrical and electronics, Marine, recreational and sports equipment, future potential of composites.

6 Hours

UNIT - 4

Characteristics of fiber-Reinforced lamina: Fundamentals, Elastic properties of a lamina, Unidirectional Continuous fiber zero degree and angle-ply lamina.

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6 Hours

PART - B

UNIT - 5

Laminated structure: Lamina to laminate, Lamination theory, lamina strains and stresses due to applied loads. Interlaminar Stresses. Simple problems.

□□□□□□□□ **7 Hours**

UNIT - 6

Metal Matrix Composites: Reinforcement materials, types, characteristics and selection base metals selection. Need for production MMC's and its application.

7 Hours

UNIT - 7

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Fabrication Process for MMC's: Powder metallurgy technique, liquid metallurgy technique and secondary processing, special fabrication techniques.

6 Hours

UNIT - 8

Study Properties of MMC's: Physical Mechanical, Wear, machinability and Other Properties. Effect of size, shape and distribution of particulate on properties.

6 Hours

Text Books:

1. **Composite Science and Engineering** by K. K. Chawla Springer Verlag 1998.
2. **Introduction to composite materials** by Hull and Clyne, Cambridge University.

Reference Books:

1. **Fiber Reinforced Composites** by P. K. Mallick, Marcel Dekker, Inc
2. **Mechanics of Composite Materials**, Robert M. Jones, McGraw Hill Kogakusha Ltd. 1998

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3. **Composite materials hand book**, Meing Schwaitz," McGraw Hill book company.1984
4. **Principles of composite Material mechanics** by Ronald F. Gibron. McGraw Hill international, 1994.

REFRIGERATION AND AIR CONDITIONING

Subject Code

:

06ME663

IA Marks

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25

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PART - A

Unit - 1

Brief review of various methods of Refrigeration: Vapour compression cycle: Analysis of Vapour Compression cycle using P-H and T-S diagrams- calculations, standard rating of operating conditions, Actual vapour compression cycle, Second law analysis of Vapour Compression Cycle.

8 Hours

Unit - 2

Refrigerants: Types of Refrigerants, Comparative study of Ethane and Methane derivatives, selection of Refrigerants, Requirements of Refrigerants, Effects of lubricants in Refrigerants, substitutes of CFC Refrigerants, Mixture Refrigerants-azeotropic mixtures

6 Hours

Unit - 3

Multi Pressure Vapour Compression systems: Multi stage compression, Multi evaporator systems, Cascade systems, calculation, production of solid carbon dioxide, System practices for multistage system.

6 Hours

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Unit - 4

Equipments used in vapour compression Refrigeration system: Compressors: Principle, types of compressors, capacity control. Condensers: Types and construction, Expansion devices: Types- Automatic expansion valve, Thermostatic expansion valves, capillary tube. Sizing Evaporator: Types & construction.

6 Hours

PART - B

Unit - 5

Vapour Absorption System: Common refrigerant absorbent combinations, Binary mixtures, Ammonia Water Absorption system, Actual vapour absorption cycle and its representation on enthalpy. composition diagram, calculations. Triple fluid vapour absorption refrigeration system. Water-Lithium Bromide absorption chiller.

□□□□□□□□ **6 Hours**

Unit - 6

Elective-I (Group A)

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Sunday, 01 November 2009 11:03 -

Psychometry of Air conditioning process-Review: Review of Psychometric processes, Summer Air conditioning, Apparatus Dew point, winter air conditioning.

Design conditions: Outside design conditions, choice of inside conditions, comfort chart. Choice of supply design condition.

6 Hours

Unit - 7

Load calculations and applied psychometrics: Internal heat gains, system heat gains, break up of ventilation load and effective sensible heat factor, Bypass factor, cooling load estimate. Psychometric calculations for cooling. Selection of Air conditioning apparatus for cooling and dehumidification, evaporative cooling.

6 Hours

Unit - 8

Transmission and distribution of Air: Room Air Distribution, Friction loss in ducts, dynamic losses in ducts, Air flow through simple Duct system, Duct design.

Controls in Refrigeration and Air conditioning equipments: High pressure and low pressure cut out, thermostats, pilot operated solenoid valve, motor controls, bypass control-Damper motor. VAV controls.

8 Hours

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Text Books:

1. **'Refrigeration and Air-Conditioning'** by C. P. Arora, Tata McGraw Hill Publication, 2nd edition, 2001.
2. **'Refrigeration and Air-Conditioning'** by W. F. Stoecker, Tata McGraw Hill Publication, 2nd edition, 1982.

Reference Books:

1. **'Principles of Refrigeration'** Dossat, Pearson-2006.
2. **'Heating, Ventilation and Air Conditioning'** by McQuiston, Wiley Students edition, 5th edition 2000.
3. **'Air conditioning'** by PITA, 4th edition, pearson-2005
4. **'Refrigeration and Air-Conditioning'** by Manohar prasad

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Sunday, 01 November 2009 11:03 -

DESIGN OF HEAT EXCHANGERS

Subject Code

:

06ME664

IA Marks

:

25

No. of Lecture Hrs./ Week

:

04

Exam Hours

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03

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52

Exam Marks

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100

PART - A

Unit - 1

Introduction to Heat Exchanger Design: Types of heat exchangers and their applications. Flow arrangements and temperature distributions in transfer type of heat exchangers. Overall heat transfer coefficient;- Clean overall heat transfer coefficient, dirt factor dirt overall heat transfer coefficient, dirt factors for various process services. Basic design equation. Mean

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temperature difference Concept: - LMTD for parallel flow and counter flow arrangement, correction factor for LMTD for cross flow and multi – pass heat exchangers.

6 Hours

Unit - 2

Shell and Tube Heat Exchangers: Constructional features. Applications. Effectiveness-NTU method for heat exchanger design/ analysis. Rating and sizing problem. Correlations for tube side pressure drop and heat transfer coefficients. Pressure drop and heat transfer coefficient correlations for shell side flow.

6 Hours

Unit - 3

Effect of by – pass and leakage calculation procedure for shell and tube heat exchanger: Heat balance equations: LMTD: reference temperature calculations: evaluation of fluid properties: flow assignments: tube side flow area calculations; viscosity correction factor, shell side equivalent diameter, calculation of shell side heat transfer coefficient, evaluation for wall temperature, evaluation of overall heat transfer coefficient, Calculation of surface area. Calculations of tube side and shell side pressure drops.

8 Hours

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Unit - 4

Steam condensers: Specifications of other details as per TEMA standards. Flow arrangement for increased heat recovery: - lack of heat recovery in 1-2 exchangers true temperature difference in a 2-4 exchanger. Calculation procedure for steam condensers.

6 Hours

PART - B

Unit - 5

Double Pipe Heat Exchangers: Constructional features. Applications. Design parameters :- tube side and shell side film coefficients cut and twist factor, fin efficiency, overall heat transfer coefficient, mean temperature difference, available surface area, fin geometry fin height, number of fins, tube side and shell side pressure drop. Calculation procedure for the design/analysis of double pipe heat exchanger.

6 Hours

Unit - 6

Compact Heat Exchangers: Introduction; definition of Geometric Terms: plate fin surface geometries and surface performance data; correlation of heat transfer and friction data; Goodness factor comparisons; specification of rating and sizing problems; calculation procedure for a rating problem.

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6 Hours

Unit - 7

Air-Cooled Heat Exchangers: Air as coolant for industrial processes; custom-built units; fin-tube systems for air coolers; fin-tube bundles; thermal rating; tube side flow arrangements; cooling air supply by fans; cooling air supply in natural draft towers.

6 Hours

Unit - 8

Furnaces and combustion Chambers: Introduction; process heaters and boiler; heat transfer in furnaces: - Heat source; Heat sink; refractory surfaces; heat transfer to the sink; Design methods: - Method of Lobo and Evans: Method of Wilson, Lobo and Hottel; The Orrok-Hudson equation; Wallenberg simplified method.

8 Hours

Text Books:

1. **Process Heat Transfer:** Donald Q. Kern, Tata McGraw –Hill Edition (1997)
2. **Compact Heat Exchangers:** W. M. Kays & A. L. London, Mcgraw –Hill co. (1997)

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Reference Books:

1. **Heat Transfer – A Basic Approach:** Necati Ozsisik, McGraw – Hill International edition (1985).
2. **Heat Exchanger Design Hand Book:** Volumes 2 and 3, edited by Ernst U schlunder. et. al Hemisphere Publishing Co. (1983)
3. **Heat exchanger-** Kokac Thermal- hydraulic and design analysis.

NON – TRADITIONAL MACHINING

Subject Code

:

06ME665

IA Marks

:

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25

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04

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Elective-I (Group A)

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100

PART - A

Unit - 1

Introduction: History, Classification, comparison between conventional and Non-conventional machining process selection.

5 Hours

Unit - 2

Ultrasonic machining (USM): Introduction, equipment, tool materials & tool size, abrasive slurry, cutting tool system design:- Effect of parameter: Effect of amplitude and frequency and vibration, Effect of abrasive grain diameter, effect of applied static load, effect of slurry, tool & work material, USM process characteristics: Material removal rate, tool wear, Accuracy, surface finish, applications, advantages & Disadvantages of USM.

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8 Hours

Unit - 3

Abrasive Jet Machining (AJM): Introduction, Equipment, Variables in AJM: Carrier Gas, Type of abrasive, size of abrasive grain, velocity of the abrasive jet, mean number. abrasive particles per unit volume of the carrier gas, work material, stand off distance (SOD), nozzle design, shape of cut. Process characteristics-Material removal rate, Nozzle wear, Accuracy & surface finish.

Applications, advantages & Disadvantages of AJM.

Water Jet Machining

:

Principal, Equipment, Operation, Application, Advantages and limitations of water Jet machinery

7 Hours

Unit - 4

Electrochemical machining (ECM): Introduction, study of ECM machine, elements of ECM process : Cathode tool, Anode work piece, source of DC power, Electrolyte, chemistry of the

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process, ECM Process characteristics – Material removal rate, Accuracy, surface finish, ECM Tooling: ECM tooling technique

& example, Tool & insulation materials, Tool size Electrolyte flow arrangement, Handling of slug, Economics of ECM, Applications such as Electrochemical turning, Electrochemical Grinding, Electrochemical Honing, deburring, Advantages, Limitations.

6 Hours

PART - B

Unit - 5

Chemical Machining (CHM): Introduction, elements of process, chemical blanking process : Preparation of work piece, preparation of masters, masking with photo resists, etching for blanking, accuracy of chemical blanking, applications of chemical blanking, chemical milling (contour machining): process steps –masking, Etching, process characteristics of CHM: material removal rate, accuracy, surface finish, Hydrogen embrittlement, advantages & application of CHM.

6 Hours

Unit - 6

Electrical discharge machining (EDM): Introduction, mechanism of metal removal, dielectric fluid, spark generator, EDM tools (electrodes) Electrode feed control, Electrode manufacture, Electrode wear, EDM tool design, choice of machining operation, electrode material selection, under sizing and length of electrode, machining time.

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Flushing; pressure flushing, suction flushing, side flushing, pulsed flushing synchronized with electrode movement, EDM process characteristics: metal removal rate, accuracy, surface finish, Heat Affected Zone. Machine tool selection, Application, EDM accessories / applications, electrical discharge grinding, Traveling wire EDM.

8 Hours

Unit - 7

Plasma Arc Machining (PAM): Introduction, equipment, non-thermal generation of plasma, selection of gas, Mechanism of metal removal, PAM parameters, process characteristics. Safety precautions, Applications, Advantages and limitations.

5 Hours

Unit - 8

Laser Beam Machining (LBM): Introduction, equipment of LBM mechanism of metal removal, LBM parameters, Process characteristics, Applications, Advantages & limitations.

Electron Beam Machining (EBM): Principles, equipment, operations, applications, advantages and limitation of EBM.

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7 Hours

Text Books:

1. **Modern machining process**, Pandey and Shan, Tata McGraw Hill 2000
2. **New Technology**, Bhattacharya 2000

Reference Books:

1. **Production Technology**, HMT Tata McGraw Hill. 2001
2. **Modern Machining Process**, Aditya. 2002
3. **Non-Conventional Machining**, P.K.Mishra, The Institution of Engineers (India) Test book series, Narosa Publishing House – 2005.
4. **Metals Handbook: Machining Volume 16**
[Joseph R. Davis](#) (Editor), [American Society of Metals](#) (ASM)

STATISTICAL QUALITY CONTROL

Subject Code

:

Elective-I (Group A)

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Sunday, 01 November 2009 11:03 -

06ME666

IA Marks

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25

No. of Lecture Hrs./ Week

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52

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100

PART - A

Unit - 1

Introduction: The Meaning of Quality and Quality Improvement; Brief History of Quality Methodology; Statistical Methods for Quality Control and Improvement; Total Quality Management (quality philosophy, links between quality and productivity, quality costs, legal aspects of quality implementing, quality improvement).

6 Hours

Unit - 2

Modeling Process Quality: Mean, Median, Mode, Standard deviation, Calculating area, The Deming funnel experiment, Normal distribution tables, Finding the Z score, Central limit

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theorem.

6 Hours

Unit - 3

Methods and Philosophy of Statistical Process Control: Chance and assignable causes, Statistical Basis of the Control Charts (basic principles, choices of control limits, significance of control limits, sample size and sampling frequency, rational subgroups, analysis of pattern on control charts, warning limits, Average Run Length

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ARL)

6 Hours

Unit - 4

Control Charts for Variables: Control Charts for X-Bar and R- Charts, Type I and Type II errors, the probability of Type II error. Simple Numerical Problems

8 Hours

PART - B

Unit - 5

Elective-I (Group A)

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Process Capability: The foundation of process capability, Natural Tolerance limits, c_p – process capability index, c

p_k

, p

p
– process performance index, summary of process measures. Numerical problems

6 Hours

Unit 6: Control Charts For Attributes: Binomial distribution, Poisson distribution (from the point of view of Quality control) Control Chart for Fraction Nonconforming, Control Chart for number Nonconforming, Control Charts for Nonconformities or Defects, Control Chart for Number of non conformities per unit. Numerical problems

7 Hours

Unit - 7

Lot-By-Lot Acceptance Sampling For Attributes: The acceptance sampling problem, single sampling plan for attributes, Double, Multiple, and Sequential sampling, AOQL, LTPD, OC curves, Military Standard 105E, the Dodge-Romig sampling plans. Numerical problems

7 Hours

Unit - 8

Cumulative-Sum (CUSUM) & Exponentially Weighted Moving Average (EWMA) Control Charts: CUSUM Control Chart (basic principles of the chart for monitoring the process mean); EWMA control chart (EWMA control chart for monitoring process mean), design of an EWMA

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control chart.

6 Hours

Text Books:

1. **Statistical Quality Control:** E.L. Grant and R.S. Leavenworth, 7th edition, McGraw- Hill publisher.
2. **Statistical Quality Control:** RC Gupta, Khanna Publishers, New Delhi, 2005

Reference Books:

1. **Statistical Process Control and Quality Improvement:** Gerald M. Smith, Pearson Prentice Hall. ISBN 0 – 13-049036-9.
1. **Statistical Quality Control for Manufacturing Managers:** W S Messina, Wiley & Sons, Inc. New York, 1987
2. **Statistical Quality Control:** Montgomery, Douglas, 5th Edition, John Wiley & Sons, Inc. 2005, Hoboken, NJ (ISBN 0-471-65631-3).
3. **Principles of Quality Control:** Jerry Banks, Wiley & Sons, Inc. New York.

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PROJECT MANAGEMENT

Subject Code

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06ME667

IA Marks

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52

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PART - A

Unit - 1

Elective-I (Group A)

Written by Administrator
Sunday, 01 November 2009 11:03 -

Concepts of Project Management: Concepts of a Project, Categories of projects, Phases of project life cycle, Roles and responsibilities of project leader, tools and techniques for project management.

5 Hours

Unit - 2

Project Planning and Estimating: Feasibility report, phased Planning, Project planning steps, Objectives and goals of the project, preparation of cost estimation, evaluation of the project profitability.

7 Hours

Unit - 3

Organizing And Staffing: The Project Team: Skills / abilities required for project manager, Authorities and responsibilities of project manager, Project organization and types, Accountability in project execution, controls, tendering and selection of contractors

7 Hours

Unit - 4

Project Scheduling: Project implementation scheduling, different scheduling techniques-bar (GANTT) charts, Bar charts for combined activities. Project Evaluation and Review Techniques (PERT) planning. Simple Numerical Problems.

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7 Hours

PART - B

Unit - 5

Co-Ordination And Control: Project direction co-ordination; and communication in a project, Role of MIS in project control, performance control, schedule control, cost Control Examples.

7 Hours

Unit - 6

Performance Measures in Project Management: Performance indicators, Performance improvement for the CM & DM companies for better project management.

□□□□□□□□**7 Hours**

Unit - 7

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Closing of project: Types of project termination, strategic implications, project in trouble, termination strategies, evaluation of termination possibilities

6 Hours

Unit - 8

Project inventory management: Nature of project inventory, supply and transportation of materials.

□□□□□□□□ **6 Hours**

Text Books:

1. **Project Management A System approach to Planning Scheduling & Controlling,** Harold Kerzner, CBS Publishers and Distributors.2002
2. **Project Management:** Benington Lawrence- Mc-Graw hill 1970

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Reference Books:

1. **Project Management with PERT and CPM**, Moder Joseph and Phillips Cer
el R., 2nd edition, New York V-AN Nostrand, Reinhold-1976.
2. **Project planning, Scheduling & control**, James P. Lewis, Meo Publishing
company. 2001
3. **Project Management**, Bhavesh M Patel, Vikas Publishing House, ISBN
81-259-0777-7 2002

OPERATION MANAGEMENT

Subject Code

:

06ME668

IA Marks

:

25

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100

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Written by Administrator
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PART - A

Unit - 1

Operations Management Concepts: Introduction, Historical Development, Operations Management Definition, Production and Manufacturing Systems, Products v

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s Services, Productivity, Factors affecting Productivity, International Dimensions of Productivity, The environment of operations, Operational excellence and world class manufacturing practices.

6 Hours

Unit - 2

Operations Decision Making: Introduction, Characteristics of decisions, framework for Decision Making, Decision methodology, Decision supports systems, Economic models, Statistical models.

6 Hours

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Unit - 3

System Design & Capacity planning: Design capacity, System capacity, and Determination of Equipment requirement. Facility Location and Facility Layout, Location Planning for Goods and Services, Foreign locations and facility layout.

6 Hours

Unit - 4

Forecasting: Forecasting Objectives and Uses, Forecasting Variables, Opinion and Judgmental methods, Time Series methods, Exponential smoothing, Regression and Correlation methods, Application and Control of Forecasts.

8 Hours

PART - B

Unit - 5

Aggregate Planning and Master Scheduling: Introduction, Planning and Scheduling, Objectives of Aggregate Planning, Aggregate Planning Methods, Master Scheduling Objectives, Master Scheduling Methods.

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□□□□□□□□ **6 Hours**

Unit - 6

Inventory Control and Materials management: Definition and Need, Components Inventory, inventory control. Scope of Materials Management, Material handling, storage and retrieval, purpose of inventories, Dependent and Independent demand, Inventory cost and Order quantities, Inventory classification and counting

6 Hours

Unit - 7

Material and Capacity Requirements Planning: Overview: MRP and CRP, MRP: Underlying Concepts, System Parameters, MRP Logic, System refinements, Capacity Management, CRP activities. Concept of continuous improvement of process.

6 Hours

Unit - 8

Purchasing & Supply management: Purchase and supply chain management- Approaches to purchase and supply chain management, make or buy decision, e-Procurement, Vender development, rating, and certification.

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8 Hours

Text Books:

1. **Operations Management**, I. B. Mahadevan. Theory and practice, Pearson, 2007.
2. **Operations Management**, I. Monks, J.G., McGraw-Hill International Editions, 1987.

Reference Books:

1. **Modern Production/Operations Management**, Buffa, Wiley Eastern Ltd.2001
2. **Production and Operations Management**, Pannerselvam. R., PHI. 2002
3. **Productions & Operations Management**, Adam & Ebert. 2002
4. **Production and Operations Management**, Chary, S. N., Tata-McGraw Hill. 2002