

Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)- ME 401

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Power Plant Engineering	ME 401	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
VII	4	3-1-0	3 Hours

Unit - I

Introduction: Power and energy; Sources of energy; Review of thermodynamic cycles related to power plants; Fuels and combustion calculations.

Load estimation; Load curves; Various terms and factors involved in power plant calculations; Effect of variable load on power plant operation; Selection of power plant units; Effect of plant type on costs; Rates; fixed elements; Energy elements; Customer elements and investor's profit; Depreciation and replacement; Theory of rates; Economics of plant selection; Other considerations in plant selection.

(08 Hours)

Unit - II

Steam Power Plant: General layout of steam power plant; Power plant boilers including critical and super critical boilers; Fluidized bed boilers; Boilers mountings and accessories; Different systems such as coal handling system; Pulverizers and coal burners; Combustion system; Draft; ash handling system; Dust collection system.

(07 Hours)

Unit - III

Power Plant Auxiliary Systems: Feed water treatment and condenser and cooling towers and cooling ponds; Turbine auxiliary systems such as governing; Feed heating; Reheating ; Flange heating and gland leakage; Operation and maintenance of steam power plant; Heat balance and efficiency; Site selection of a steam power plant.

Electrical System: Generators and generator cooling; Transformers and their cooling; Bus bar; etc. **(07 Hours)**

Unit - IV

Diesel Power Plant: General layout; Components of diesel power plant; Performance of diesel power plant; Fuel system; Lubrication system; Air intake and admission system; Supercharging system; Exhaust system; Diesel plant operation and efficiency; Heat balance; Site selection of diesel power plant; Comparative study of diesel power plant with steam power plant.

Gas Turbine Power Plant: Layout of gas turbine power plant; Elements of gas turbine power plants; Gas turbine fuels; Cogeneration; auxiliary systems such as fuel; Controls and lubrication; Operation and maintenance; Combined cycle power plants; Site selection of gas turbine power plant. **(08 Hours)**

Unit - V

Nuclear Power Plant: Principles of nuclear energy; Layout of nuclear power plant; Basic components of nuclear reactions; Nuclear power station; Nuclear waste disposal; Site selection of nuclear power plants.

Hydro Electric Station: Hydrology; Principles of working; Applications; Site selection; Classification and arrangements; Hydro-electric plants; Run off size of plant and choice of units; Operation and maintenance; Hydro systems; Interconnected systems.

Non Conventional Power Plants: Introduction to non-conventional power plants (Solar; wind; geothermal; tidal) etc. **(08 Hours)**

Unit - VI

Instrumentation: Purpose; Classification; Selection and application; Recorders and their use; Listing of various control rooms.

Pollution: Pollution due to power generation. **(07 Hours)**

Recommended Books:

1. Power Plant Engineering by P.K. Nag; Tata McGraw Hill.
2. Power Plant Engineering; Mahesh Verma; Metropolitan Book Company Pvt. Ltd. New Delhi.
3. Steam & Gas Turbines & Power Plant Engineering by R. Yadav; Central Pub. House.

School of Engineering (Mechanical Engineering)- ME 403

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Computer Aided Design	ME 403	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
VII	4	3-1-0	3 Hours

Unit - I

Introduction: Introduction to CAD/CAED/CAE; Elements of CAD; Essential requirements of CAD; Concepts of integrated CAD/CAM; Necessity & its importance; Engineering applications.

Collaborative Engineering: Collaborative design; Principles; Approaches; Tools; Design Systems; Product data management (PDM). **(06 Hours)**

Unit - II

Computer Graphics-I: CAD/CAM systems; Graphics input devices-cursor control Devices; Digitizers; Keyboard terminals; Image scanner; Speech control devices and touch; Panels; Graphics display devices; Cathode ray tube; Random & Raster scan display; Colour CRT monitors; Direct view storage tubes; Flat panel display; Hard copy printers and plotters. **(07 Hours)**

Unit - III

Computer Graphics-II: Graphics standards; Graphics software; Software configuration; Graphics functions; Output primitives- Bresenham's line drawing algorithm and Bresenham's circle generating algorithm.

Geometric Transformations: World/device Coordinate representation; Windowing and clipping; 2 D geometric transformations; Translation; Scaling; Shearing; Rotation & reflection matrix representation; Composite transformation; 3 D transformations; multiple transformation. **(08 Hours)**

Unit - IV

Curves: Curves representation; Properties of curve design and representation; Interpolation vs approximation; Parametric representation of analytic curves; Parametric continuity conditions; Parametric representation of synthetic curves-Hermite cubic splines-Blending function formulation and its properties; Bezier curves-Blending function formulation and its properties; Composite Bezier curves; B-spline curves and its properties; Periodic and non-periodic B-spline curves.

(08 Hours)

Unit - V

3D Graphics: Polygon surfaces-Polygon mesh representations; Quadric and Super-quadric surfaces and blobby objects; Solid modeling-solid entities; Fundamentals of solid modeling-set theory; regularized set operations; Half spaces; Boundary representation; Constructive solid geometry; Sweep representation; Color models; Application commands for CAD software.

(08 Hours)

Unit - VI

Advanced Modeling Concepts: Feature based Modeling; Assembly modeling; Behavioral modeling; Conceptual design & top-down design; Techniques for visual realism - hidden line - surface removal; Algorithms for shading and Rendering; Parametric and variational modeling; Feature recognition; Design by features; Assembly and tolerance modeling; Tolerance representation - specification; Analysis and synthesis; AI in Design.

(08 Hours)

Recommended Books:

1. Computer Aided Engineering Design; Anupam Saxena & B. Sahay; Anamaya Publishers.
2. Computer Graphics; Hearn & Baker; Prentice Hall of India.
3. CAD/CAM; Mikell P. Groover & E. W. Zimmers Jr.; Prentice Hall India Ltd.
4. CAD/CAM; P. N. Rao; Tata McGraw Hill.

School of Engineering (Mechanical Engineering)- MEE 505

Degree	Course Name	Course Code	Marks:100
M. Tech.	Operation Research	MEE 505	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
I / II	4	3-1-0	3 Hours

Unit - I

Linear programming; Graphical and simplex method; Sensitivity analysis in linear programming; Computer application in linear programming. **(07 Hours)**

Unit - II

Network analysis; Transportation models; Transshipment models; Maximal flow model; Shortest route model; Minimum spanning tree; Project management; Computer application in network analysis. **(08 Hours)**

Unit - III

Advanced topic in linear programming: Duality and its application; Parametric programming; Integer programming; Linear fractional programming; Goal programming; Sensitivity analysis. **(08 Hours)**

Unit - IV

Dynamic programming: Basic concept; Development of dynamic; Programming; continuous state dynamic programming; Multiple state variable; stochastic system. **(08 Hours)**

Unit - V

Non linear programming: Unconstrained optimization; Constrained optimization with equality constraints; Constrained optimization with inequality constraints; Optimization by cutting plane method; Optimization by geometric programming. **(08 Hours)**

Unit - VI

Genetic algorithm; Taboo search; Simulating Annealing.

(06 Hours)

Recommended Books:

1. Operation Research; Ravindran; Phillips & Solberg; Wiley India Edition.
2. Operation Research; Hira & Gupta; S. Chand & Company Ltd.
3. Operation Research; A. M. Natrajan; P. Balasubramani; A. Tamilarasi; Pearson Prentice.
4. Operation Research; S. D. Sharma; Prentice Hall of India.

School of Engineering (Mechanical Engineering)- MEE 508

Degree	Course Name	Course Code	Marks:100
M. Tech. Ind. Engg. & Management	Modeling & Simulation	MEE 508	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
I	4	3-1-0	3 Hours

Unit - I

Introduction to simulation; Systems; Models; Data collection and analysis; Monte carlo simulation; Types of system simulation; Decision making with simulation; Areas of simulation application.

(06 Hours)

Unit - II

Queuing models; Characteristics of queuing systems; Queuing notions; Long run measures of performance of queuing systems; Steady state behavior of Markovian models (M/G/1; M/M/1; M/M/c); Overview of finite capacity and finite

calling population models; Network of queues; Monte carlo simulation and its applications in queuing and inventory models. **(06 Hours)**

Unit - III

Generation of (Pseudo) random numbers; Probability distributions and probability densities; Sampling from probability distribution: Inverse method; Convolution method; Acceptance rejection method. **(08 Hours)**

Unit - IV

Discrete simulation; Continuous simulation; Combined simulation; Problem formulation; Mechanics of discrete simulation- discrete events; Representation of time; Generation of arrival pattern; Simulation examples; Simulation programming tasks; Gathering statistics; Measuring utilization and occupancy recording distributions and transit times. **(08 Hours)**

Unit - V

Steps to build a useful model of input data; Data collection; Verification of simulation models; Validation process; Simulation software; Classification of simulation software and desirable software features; Comparison of simulation packages with programming languages; General purpose simulation packages; Object oriented packages; Case studies. **(11 Hours)**

Unit - VI

Analysis of simulation output; Importance of the variance of the sample mean; Procedure for estimating variance; Subinterval method; Replication method; Regenerative method; Variance reduction techniques; Start up policies; Stopping rules; Statistical inferences; Design of experiments. **(06 Hours)**

Recommended Books:

1. Discrete Event System Simulation; Banks; Pearson's Education

2. Simulation Modeling and Analysis; 3rd edition; A. M. Law and W. D. Kelton; McGraw Hill.
3. System Simulation 2nd edition; G. Gordon; PHI Learning.
1. Probability and Statistics with Reliability; Queuing; and Computer Science Applications; K. S. Trivedi; Prentice Hall of India.
2. Introduction to Probability and Random Variables; G. P. Wadsworth and J. G. Bryan; McGraw Hill.
3. Theory of Modeling and Simulation; Bernard.
4. Performance Modeling of Automated Manufacturing Systems; N. Viswandhan and Y. Narhari; Prentice Hall of India.
5. Simulation Model Design and Execution; P. Fishwick; Prentice Hall.
6. Simulation; S. Ross; Academic Press.