INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDHALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO: 3 OF 2009)
DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2011-2012

Year: B.Tech. III Year
SEMESTER: V

S No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			Credits
		(THEORY)	L	T	P	INTERNAL ASSESSMENT*	ESE	TOTAL	
1.	IPE-351	Machine Design-**I**	3	1	-	40	60	100	4
2.	IPE 352	Quality Control & Reliability Engineering	3	1	-	40	60	100	4
3.	IPE -353	Turbo Machinery	3	1	-	40	60	100	4
4.	IPE -354	Decision Techniques	3	1	-	40	60	100	4
5.	IPE -355	Numerical Analysis & Computer Programming	3	1	-	40	60	100	4
		Total	15	5		200	300	500	20

		(PRACATICALS)							
6.	IPE – 356	Turbo Machinery Lab	-	-	3	30	20	50	2
7.	IPE – 357	Numerical Analysis & Computer Programming	-	-	3	30	20	50	2
8.	IPE -358	Seminar	-	-	3	50	-	50	2
		Total			9	110	40	150	26

Total Credits: 26

Total Contact Hour: 29

Total Marks: 650

*INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH V Sem	IPE-351	Machine Design-I	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

IPE-351 Machine Design-I

Unit-I

Steady stresses and variable stresses in machine member-introduction to the design process factors influencing machine design, selection of material based on mechanical properties ,direct, bending and torsional stress equation ,impact and shock loading ,calculation of principle stresses for various load combination ,eccentric loading ,design of curved beams ,crane hook and 'c' frame ,factor of safety ,theories of failure ,stress concentration, fatigue design for variable loading ,solderberg ,Goodman and Gerber relations.

Unit-II

Riveted joints – failure of riveted join, strength and efficiency of riveted joint. Design of butt and lap joint for a boiler, eccentrically loaded riveted joint.

Design of thread joints, bolted joint in tension, torque requirement for bolt tightening ,bolted joint under fluctuating load. Eccentrically loaded joint in shear ,bolted joint with combined stresses.

Unit-III

Design of cotter and knuckle joints, socket and spigot cotter joint, sleeve and cotter joint Gib and cotter joint, design of knuckle joints.

Welded joints- stresses in butt and fillet welds, strength of welded joints ,eccentrically loaded joint, welding joint subjected to Bending moment.

Unit-IV

Design of Keys and coupling, flat and square keys, woodruff keys, splines, muff coupling, compression coupling, flange coupling, flexible coupling.

Unit-V

Design of shafts: subjected to twisting moment, bending moment, combined twisting moment and bending moment, fluctuating loads, design of shaft on the basis of rigidity.

Text Books:

1. Machine Design-Bhandari, TMH
2. Machine Design:Spott, TMH
3. Machine Design: J.Shigley, TMH
4. Machine Design: Khurmi & Gupta, Khanna Publisher.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH V Sem	IPE-352	Quality Control & Reliability Engineering	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

IPE-352 Quality Control & Reliability Engineering

UNIT - 1

Basic concepts of Quality, Inspection definition of quality, quality control cost of quality, Value of quality, Statistical Quality Control, Need and advantages of SQC

Frequency distribution, Variables & attributes, quality characteristics, Theory of control charts, control chart for variable X & R chart, Control chart for attribution p, np, C, Chart & process capability

UNIT - 2

Quality Assurance, Quality assurance Manual, Quality Circle, characteristics of quality circle and the process of operation of quality circle, quality Policy & procedure & objectives, Acceptances Sampling, Concept of sampling, O-C curve & its construction ,Sampling plans, single, doubles & multiple sampling plans.

UNIT - 3

Contribution of Various Quality Management Gurus, Juran Triology, Deming's 14 Points, P-D-C-A Wheel, Taguchi's philosophy, Design of experiment, old and new Seven QC Tool of Quality, Philip Crosby's zero defect, seven types of waste, 5's, Quality function deployment

UNIT - 4

Introduction to ISO 9000, Various models of ISO 9000, Clauses of 9000, Total   Quality Control, Total Quality Management, Tool for TQC & TQM, Kaizen. 6 sigma quality, procedure of six sigma, TQM and Six Sigma

UNIT - 5 Reliability

Definitions, Bathtub curve, design for reliability, Failures & causes of failures, FMECA, Maintainability & Availability, MTBF, Reliability Models ,

System with components in series & in parallel, mixed arrangement, fault –tree-technique.

Recommended Books

1. SQC by Grant & Livingsworth -   Tata Mc. Hill
2. Quality Planning & Analysis by Juran & Gryana - Tata Mc. Hill
3. Total Quality Control By A. Feigenbaum - Mcgraw Hill
4. SQC by M.Mahajan – Dhanpat rai publication
5. Total quality management – Besterfield Tata Mc. Hill
6. Total quality management – Purnima charantimath (LowPearson Education)

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH V Sem	IPE-353	TURBO MACHINERY	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

IPE-353 TURBO MACHINERY

UNIT-I Nozzles & Diffuser:
Nozzles & Diffuser types, their efficiency, critical pressure & velocity, relationship between area, velocity & pressure in nozzles flow.
Steam Turbine Types:
Steam turbine-principal of operation of steam turbine, types, impulse turbine, compounding of steam turbine pressure compounded velocity compounded and pressure-velocity compounded impulse turbine.
Velocity diagram for impulse turbine, force on the blade and work done, blade or diagram efficiency, gross stage efficiency, influence of ration of blade to steam speed on blade efficiency in a single stage impulse turbine, impulse blade section, choice of blade angle.

UNIT –II Impulse-reaction turbine:
Velocity diagram, degree of reaction, Impulse-Reaction turbines with similar blade section and half degree of reaction (parson's turbine) Height of reaction, blade section.
Energy losses in steam turbine-internal and external losses in steam turbine.

UNITS –III State points Locus & reheat factors:
Factor-stage, efficiency of impulse turbine, stage point locus of an impulse turbine, state point locus for multistage turbine reheat factor.
Internal efficiency, overall efficiency, relative efficiency, Design procedures of impulse & impulse reaction turbine.
Governing of steam turbine:
Throttle governing, nozzle governing, bypass governing, combination of throttle and nozzle, governing and combination of bypass and throttle governing.
Effect of governing on the performance of steam turbine.

UNIT –IV Gas turbine:
Classification of Gas turbine, simple open cycle gas turbine, ideal and actual (Brayton cycle) for gas turbine.
Optimum pressure ratios for maximum specific output in actual gas turbine, Regeneration, reheat and inter cooling and effect of these modification on efficiency and output, closed cycle gas turbine.

UNIT –V Turbo compressors:
Introduction, classification of Centrifugal Compressor- Component working, velocity

diagram, calculations of power and efficiencies.

Slip factor, surging and choking, power and efficiencies.

Axial Flow Compressor:

Construction and working, velocity diagram, calculation of power and efficiencies, Degree of reaction, work done factor, stalling, comparison of centrifugal and axial flow compressor.

Text Books:

1. Steam and Gas Turbine – R. Yadav by C.P.H. Publication, Allahabad

2. Turbine, Compressors and Fans – S.M. Yahya – TMH

3. Gas Turbine – V. Ganeshan – TMH.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH V Sem	IPE-354	DECISION TECHNIQUES	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

IPE-354 DECISION TECHNIQUES

UNIT I

Introduction to linear programming, graphically solution to linear programming problem, solving linear problem by simplex method, optimization problem, maximization & minimization function with or without constraints, sack surplus & artificial, variable method, degeneracy problem.

UNIT II

Mathematical statement of the transportation problem, the transportation model, method for basic feasible solution, Degeneracy & unbalance problem , Mathematical statement of the assignment problem, solution of assignment problem ,traveling sales-man problem.

UNIT III

Game theory rule of game, Method of solving game graphically & Arithmetic , saddle point & without saddle point dominance method, mixed strategies 2 X 2game , 2 X N game , M X 2 game , 3 X 3game (Method of matrix's, method of linear programming etc).

Dynamic Programming: Introduction, Need, distinguishing characteristics of dynamic programming, dynamic programming approach. Cargo loading problem.

UNIT IV

Introduction of queuing theory, methods depends up on service provider customer number of channel Birth and death model.

Simulation, continuous & discrete montecarlo simulation Generation of random number and its problem.

UNIT V Network analysis, Introduction of PERT & CPM, computation of PERT, Time estimation , measure of deviation & variation , probability of computing project , Arrow diagram & critical path scheduling & crushing graph.

Recommended Books:

1. Statistics for management Rubin & levin
2. Quantitative Techniques, N. D. Vohra – TMH Publication
3. Operation Research– Hira & Gupta – S. Chand & Co.
4. Operation Research – H. Gillette – TMH, New Delhi
5. Operations Research – M. Taha – TMH, New Delhi
6. Fundamental of Operations Research – Ackof Sasieni- Dhanpat Rai & Sons
7. Quantitive Approach to Management- Lovin and Krit Patrick- TMH
8. Operation Research-S.D. Sharma- S. Chand & Com. New Delhi

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH V Sem	IPE-355	NUMERICAL ANALYSIS & COMPUTER PROGRAMMING	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

IPE-355 NUMERICAL ANALYSIS & COMPUTER PROGRAMMING

UNIT-I Approximation and errors in Computation
Approximation and round of errors, truncation errors and Taylor series, Determination of roots of polynomials and transcendental equations by Graphical methods and Bisection, Regula-falsi, secant and Newton-Raphon methods, solution of Linear simultaneous, linear algebraic equations by gauss Elimination Gauss-Jordan and Gauss-Siedel iteration method.

UNIT-II Empirical Laws, Curve Fitting & Interpolation
Curve fitting linear and non-linear regression analysis (Method of group average and least squares) finite differences, backward, forward and central difference relation and their use in Numerical differentiation and integration and their application in interpolation.

UNIT-III Numerical Solution of Ordinary Differential Equations
Numerical Integration by Trapezoidal rule, Simpson's ($1/3^{rd}$ & $3/8^{th)}$ rule and its error estimation. Application of difference relations in the solution of partial differential equations. Numerical solution of ordinary differential equations by Taylor's series, Euler, modified Euler, Runge-Kutta and Predictor-Corrector method.

UNIT-IV Numerical Solutions of partial differential Equations
Introduction, classification of second order equations, finite difference approximations to partial derivatives, elliptic equations, solution of Laplace equation, solution by Poisson's equation, solution of elliptic equations by relaxation method, parabolic equations, solution of one-dimensional heat equation, solution of two-dimensional heat equation, Hyperbolic equations, solution of wave equation.

UNIT-V Computer Programming

I/O Statement, Mathematical Relational & Conditional statement & Expressions. Switch Loops and Control Statement. Introduction to one dimensional array and two dimensional arrays. Basic of I/O file Handling.

Text Books:
1. Numerical Methods in Engineering & Science-Dr. B.S.Grewal-Khanna Publishers, 6th Edn.2004.
2. Numerical Methods-P.Kandasamy,K.Thilagavathy & K. Gunavathy-S Chand & Co.,2nd Rev. Edn.-2003

REFERENCES:
1. Let us C-Yashwant kanitkar
2. Introductory Methods of Numerical Analyisi-S.S.Sastry,3rd Edn.-PHI-New Delhi,2003
3. Numerical Methods Analysis-James B.Scarborough, 6th Edn. Oxford & IBH Publishing Co.-New Delhi.
4. Theory & Problem in Numerical Methods-T Veerarajan,T. Ramchandran-TMH,New Delhi,2004
5. Numerical Methods for Engineers-Steven C. Chapra,Raymond P. Canale,4th Edn.,TMH,New Delhi,2004
6. The Spirit of C-Henry Mullish & Herbert L.Cooper-Jaico Pub. House.