Scheme of Examination - THIRD SEMESTER

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Continual Assessment	End Sem Examination	Total
1	24CAD302T	Professional Elective-V	3	-	-	3	30	70	100
2	24CAD303T	Open Elective	3	-	-	3	30	70	100
3	24CAD301P	Dissertation Phase-I	-	-	20	10	50	50	100
Total			**6**	**0**	**20**	**16**	**110**	**190**	**300**

24CAD302T	**Professional Elective - V**
24CAD302T (i)	PE-V Supply Chain Management
24CAD302T (ii)	PE-V Advance Mechanism Design

24CAD303T	**Open Elective**
24CAD303T(i)	Industrial Safety
24CAD303T (ii)	Operations Research

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CAD302T(i)	PE-V Supply Chain Management	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
To provide knowledge of strategic importance of supply chain design and planning of an organization, the role of inventory management and forecasting in a supply chain, facility planning and scheduling models.	• Define the goal of a supply chain and analysis the impact of supply chain • Decisions on the success of a firm and Identify drivers of supply chain performance. • Analyse demand forecasts and supply for both an enterprise and a supply chain • Apply operations planning, MRP, and aggregate planning concepts in a supply chain. • Design a supply chain network for a firm or organisation • Judge and select the best supplier for a firm or organisation

Unit I	**[8Hrs]**
Introduction to Supply Chain Management: Understanding thesupply chain, Supply Chain Performance- Achieving strategic fit and scope, complexity, key issues, Supply Chain Drivers and Metrics, Centralized vs. decentralized systems	
Unit II	**[8Hrs]**
Planning Demand and Supply in a Supply Chain: Forecasting-Need for forecasting, Quantitative methods. Inventory Management- Various costs in inventory management and need, Deterministic models and discounts, Probabilistic inventory management. Aggregate Planning The Role of Aggregate Planning, Aggregate Planning Strategies.	
Unit III	**[8Hrs]**
Facility Planning and Scheduling models: Facility layout and location-Qualitative aspects, Quantitative models for layout decisions, Product, process fixed position, group layout, Location decisions-quantitative models. Scheduling models-Scheduling in MRP system, Sequencing rules and applications, Batch production sequencing and Scheduling.	
Unit IV	**[8Hrs]**
Designing the Supply chain network: Distribution Networks–Design options for a distribution network, e-Business and the distribution network, Network design in an uncertain environment. Transportation Networks-Design options for a transportation network, Trade-offs in transportation design, Supply Chain Optimization	
Unit V	**[8Hrs]**
Managing Cross-Functional Drivers in a Supply Chain: Sourcing Decisions-Make or buy decisions, Third-and fourth-party logistics providers, Sourcing Processes. Pricing and Revenue Management in a Supply Chain, Information Technology in a Supply Chain,Coordination in a Supply Chain	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Supply Chain Management, strategy, planning, and operation	Chopra, S., and Meindl, P.	2nd	PHI
2.	Operations Management	Evans and Collier		

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Logistics and Supply Chain Management	Christopher		Pearson Education Asia
2.	Manufacturing Operations and Supply Chain Management (The LeanApproach)	Taylor and Brunt		BusinessPressThomson Learning,NY

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CAD302T(ii)	PE-V Advance Mechanism Design	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
To make students well versed with advance concepts of mechanism analysis like kinematic analysis, position and displacements, synthesis of mechanism and analysis of robotic arm.	• Understand basic mechanisms in machines. DOF • Performa kinematic analysis various mechanisms for velocity and acceleration. • Determine position and displacements of moving points of mechanisms. • Synthesize tvarious mechanisms • Perform forward and inverse kinematics of robotic arm and its linkages.

Unit I	**[8Hrs]**
Introduction: Review of fundamentals of kinematics, Mobility analysis, Formation of one D.O.F. multi loop kinematics chains, Network formula: Gross motion concepts	
Unit II	**[8Hrs]**
Kinematic Analysis: Position Analysis: Vector loop equations for four bar, Slider crank, inverted slider crank, Geared five bar and six bar linkages, Analytical methods for velocity and acceleration analysis, Four bar linkage jerk analysis, Plane complex mechanisms.	
Unit III	**[8Hrs]**
Position and Displacement: Locus of moving point, position of point, position difference between points, apperent and absolute position of points, Loop closure equation, Graphical position analysis	
Unit IV	**[8Hrs]**
Synthesis of Mechanism: Type synthesis, Number synthesis, Associated Linkage Concept, Dimensional synthesis, function generation, Path generation, Motion generation, Graphical Methods, Cognate linkages, Coupler curve synthesis, Design of six-bar mechanisms. Algebraic methods, Application of instant center in linkage design. Cam Mechanisms, determination of optimum size of Cams.	
Unit V	**[8Hrs]**
Robotics: Introduction, Topological arrangements of robotic arms, forward kinematics, Inverse position analysis, Inverse velocity and acceleration analysis, Robot actuator force analysis	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Theory of Machines and Mechanisms	Shigley J.E., and Uicker, J.J.,	1995	McGraw Hill, 1995
2.	Theory of Mechanism and Machines	Amitabha Ghosh and Asok Kumar Mallik	1999	EWLP, Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design of Machinery	Sandor G.N., and Erdman A.G	1995	Prentice Hall
2.	Manufacturing Operations and Supply Chain Management (The LeanApproach)	Nortron R.L	1999	McGraw Hill

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CAD303T (i)	OE-Industrial Safety	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
The objectives of subject is to prevent accidents in industry by reducing any hazard to minimum and to reduce workman's compensation, insurance rate and all the cost of accidents along with improvement in occupational health and safety and its management	• Develop students to handle the complex industrial environment • Give knowledge about occupational health, industrial hygiene, accidental prevention techniques to the students. • Make the student aware about safety auditing and management systems, pollution prevention techniques etc. • Train the students about risk assessment and management in Industry

Unit I	**[8Hrs]**
Occupation, Safety And Management; Occupational Safety, Health and Environmental Safety, Management – Principles & practices, Role of Management in Industrial Safety, Organization Behavior on Human factors contributing to accident.	
Unit II	**[8Hrs]**
Planning for Safety: Planning: Definition, purpose, nature, scope and procedure. Management by objectives and its role in Safety, Health and Management (SHE)	
Unit III	**[8Hrs]**
Monitoring for Safety, Health & Environment: Occupational Safety, Health and Environment Management System, Bureau of Indian Standards on Safety and Health: 14489 – 1998 and 15001 – 2000, ILO and EPA Standards. Principles of Accident Prevention: Definition: Incident, accident, injury, dangerous, occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes etc.	
Unit IV	**[8Hrs]**
Education, Training and Employee Participation in Safety: Element of training cycle, Assessment of needs. Techniques of training, design and development of training programs. Training methods and strategies types of training. Evaluation and review of training programs. Competence Building Techniques (CBT), Concept for training, safety as a on-line function. Employee Participation: Purpose, areas of participation, methods, Role of trade union in Safety, Health and Environment Protection.	
Unit V	**[8Hrs]**
Management Information System: Sources of information on Safety, Health and Environment Protection. Compilation and collation of information, Analysis & use of modern methods of programming, storing and retrieval of MIS for Safety, Health and Environment. QCC HS Computer Software Application and Limitations.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Industrial Safety , Health and Environment Management Systems	R.K. Jain and Sunil S. Rao,	2006	Khanna publishers, New Delhi
2.	Industrial Safety and Environment	A.K. Gupta	3rd	Laxmi Publications Pvt Ltd

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Industrial Safety, Health Environment and Security	Basudev Panda	-	Laxmi Publications Pvt Ltd

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CAD303T(ii)	OE-Operations Research	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
To make students well versed with advance concepts of Operations research like dynamic programming, non-linear programming, sensitivity analysis and other real world problems.	• Students should able to apply the dynamic programming to solve problems of discreet and continuous variables. • Students should able to apply the concept of non-linear programming • Students should able to carry out sensitivity analysis • Student should able to model the real world problem and simulate it.

Unit I	**[8Hrs]**
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	
Unit II	**[8Hrs]**
Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming	
Unit III	**[8Hrs]**
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT	
Unit IV	**[8Hrs]**
Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.	
Unit V	**[8Hrs]**
Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Operations Research, An Introduction	H.A. Taha	2008	PHI
2.	Principles of Operations Research	H.M. Wagner	1982	PHI

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Introduction to Optimisation: Operations Research	J.C. Pant	2008	Jain Brothers, Delhi
2.	Operations Research	Pannerselvam	2010	Prentice Hall of India