VEER NARMAD SOUTH GUJARAT UNIVERSITY

PG DIPLOMA IN CAD/CAM/CAE

Semester-II

Sr. No.	Subject Code	Subject Name	Scheme		Marks	
			L	P	L	P
1	CA 201	Process Equipment Design and Drawing.	3	9	100	150
2	CA 202	Computer Aided Engineering.	3		100	
3	CA 203	Advanced Computer Aided Manufacturing- II.	3		100	
4	CA 204	Project Management and Quality Standards.	3		100	
5	CA 205	Project	0	6	0	200
		TOTAL	12	15	400	350

Minimum Marks required for passing is 40% in each theory papers, practical and project separately.

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CA 201
PROCESS EQUIPMENT DESIGN AND DRAWING

- Introduction of pressure vessels and its various components with the latest available design code of construction.
- Mechanical Design Basics and its applications. Various criteria of design using elastic-plastic theory, fatigue and creep ruptures.
- Design of vessels under various internal and external loadings i.e.: internal pressure, external pressure, wind/seismic loads, piping loads, thermal loads & cyclic loads.
- Selections of various pressure vessel components i.e., head, skirt, nozzle & pipes based on different loadings.
- Selection of different materials of pressure vessel as per various code of construction.
- Overview of the ASME design code for design criteria, selection of material and construction details.
- Understanding of the various stresses in the pressure vessel i.e., stresses in cylindrical shells, heads, external rings, discontinuity stresses at different geometry, thermal stresses, general and localized stresses, primary and secondary stresses, stresses due to fatigue and creep phenomenon.
- Design of storage vessel, storage of non-volatile and volatile liquids and gases, codes for storage vessel design, bottom and shell designs.
- Design of various columns i.e., distillation, fractionation, depropenisation.
- Design of special high-pressure vessel.
- Design of heat exchangers, shell and tube heat exchangers, tube sheet channels, shell joints, baffles, tie rods, expansion provisions.
- Design of various supports on vertical and horizontal vessels.
- Process hazards & safety measures and design of pressure relief valves.

- Evaluation of pressure vessel in various mode of fabrication like, erection, hydro test and heat treatment.
- Overview of the fabrication techniques and welding processes.

DRAWING

- Fabrication drawing preparation and understanding for pressure vessels, tanks, columns & heat exchangers.
- Drawing preparation of various components of pressure vessel such as heads, skirt, nozzles, flanges, elbows, spools, trays, chimneys, external & internal supports.
- Drawing of various components of heat exchanges like tube-sheets, baffles, tie rods, trays, nozzles & flanges, external supports.

BOOKS :

1. M. V. Joshi, ‘ Process Equipment Design’, McMillan Co. India, 1976.
2. L. E. Brown, E. H. Young, ‘Process Equipment Design’, Wiley Eastern Ltd., New Delhi. 1977.
3. B. C. Bhattacharya, ‘Introduction to Process Equipment Design’.
4. Denis Moss
5. Javed & Farr, ‘Structural …….& design of process equipment’
6. W. C. Young, ‘Roarks’ Formula for stress & strain’
7. E. F. Megyesy, ‘ pressure vessel handbook’
8. TEMA

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CA 202
COMPUTER AIDED ENGINEERING

- Introduction: Fundamentals of modelling to do CAE, Generating FEM models, Understanding of nodes, elements & element matrix, Use of different types of meshing, Implications of material properties and physical properties in mesh creation, Know mapped mesh and free mesh, Difference of shell and solid mesh.
- Boundary Conditions: Boundary condition creation, Define various load and other related parameters considering application and requirement, Use of symmetric/axi-symmetric boundary conditions
- Solutions: Different types of analysis and its applications, Different solvers and its use. Results interpretation and comparison, Acceptable Criteria, Allowable limits as per various codes and standards, Actual stress and displacement comparison.
- Axisymmetric solids subjected to axisymmetric loading: Introduction, Axisymmetric formulation, Finite element modelling: Triangular elements, Problem modelling and boundary conditions etc.
- Non linear analysis: Nonlinear finite element in design, Lagrangian and eulerian finite elements in one dimension- governing equations for total Lagrangian formulation, weak formulation for total Lagrangian, finite element discritization in total Lagrangian, elements and global matrices, governing equations for updated Lagrangian formulation, weak formulation for updated Lagrangian formulation, finite element discritization and elements and global matrices for updated Lagrangian formulation, Continuum mechanics, Lagrangian meshes, Constitutive models- stress-strain curve, 1-D elasticity, nonlinear elasticity,
- Basic concepts of Finite Element Analysis for different type of analysis such as, Buckling analysis, Contact analysis, Optimization etc.

Books

1. Software User Manual
2. Software Tutorial Guide
3. Design by Analysis – Pressure Equipment Directive

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CA 203
ADVANCED COMPUTER AIDED MANUFACTURING - II

- Introduction to CNC turning operations, Part programme for turning cycles, pattern of holes, taper turning, Grooving and parting off operation, knurling operation, single point threading operation, Four-axis lathes
- Introduction to CNC Milling operations, Part programme for slots-pockets and planner milling, helical milling, thread milling, standard and rigid taping operation, Programming with taper end mills.
- Part programming for special features like Gears (Helical, spur), cam profiles etc., part programme for horizontal machining centre.
- Advanced part programming: Polar co-ordinates, Parameters, Looping and Jumping, Subroutines, Mirror imaging and Scaling, coordinate rotation, Special canned cycles and Fanuc Macros.
- Integrated Manufacturing System: Definition - application - features - types of manufacturing systems-machine tools-materials handling system-computer control system - DNC systems manufacturing cell. Flexible manufacturing systems (FMS) - the FMS concept-transfer systems - head changing FMS – variable mission manufacturing system - Artificial Intelligence in CIM.

Books

1. CAD/CAM principles, -P.N.Rao, Tata McGraw-Hill publishing company limited New Delhi.
2. CNC Programming Techniques,- Peter Smid, Industrial Press Inc.
3. FANUC CNC custom macros, - Peter Smid, Industrial Press Inc.

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CA 204
PROJECT MANAGEMENT AND QUALITY STANDARDS

- **Introduction:** Foundations of Project Management, Project Life Cycle, Project Environment, Project Selection, Project Proposal, Project Scope, Work Breakdown Structure, documentation.
- **Project Monitoring, Control and Costing:** Critical Path Method, Program Evaluation & Review Technique, Planning and Scheduling of Activity Networks, Assumptions in PERT Modeling, Time-cost Trade-offs, Estimation of Project Costs, Monitoring Project Progress, Project Appraisal and Selection, Recent Trends in Project Management, Introduction to project management software.
- **Quality Systems:** Introduction to ISO, TQM and 6σ, Quality Systems Standards,Quality functions & functions-various definitions such as quality function, quality measurement, quality costs. Quality in production, design, marketing etc. Quality conduit, SQC, quality assurance, total quality control,TQM- Introduction, history, principles, Quality policy, Quality system, Quality management, TQM system & models, Essentials of TQM, ISO 9000 quality management system, ISO 9000 elements, applications and benefits. Zero defect. Implementation registration & certification for ISO 9000, Case studies on TQM.

Books

- LIPTAK: Process Control Handbook
- ANDREWS: Applied Instrumentation in Process Industries
- TAPAN BAGCHI: ISO-9000 Concepts, Methods and Implementation, WHEELER
- ISO-9000 Guidelines for the process industries
- N. LOGO THETIS, “Managing for total quality”-Prentice Hall of India Pvt. Ltd.-1997.
- JOEL E. ROSS, “Total Quality Management”-Varity Book International, New delhi-1995.
- S.M. SUNDAVA RAJU, “Total Quality Management”-Tata Mc Graw Hill Publishing Co. P. Ltd, New Delhi-1995.
- A.N.SINGH, “reparation, Implementation & Registration of ISO 9000 Quality System”- Dolphin Books, New Delhi-1993.