Course Code	**PCC_DE201**				
Course Category	**Professional Core Course**				
Course Title	**Introduction to the Theory of Plates and Shells**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**2**	**4**	

Introduction to plate theory and background, Navier's method for rectangular plate, levy's method for rectangular plate, axi-symmetrical bending of circular plate, approximate methods for bending of plate, buckling of thin plate, approximate methods for buckling of thin plate, introduction to shell structures and shell geometry, membrane theory for surface of revolution, membrane theory of pressure vessels, membrane analysis for cylindrical shell roof, general theory of cylindrical shell.

Text Books Recommended

1. S. Timoshenko and S. Woinowsky-Krieger, “Theory of plates and shells,” 1959.

Reference

2. J. N. Reddy, Theory and analysis of elastic plates and shells. CRC press, 2006.

Course Code	**PCC_DE202**				
Course Category	**Professional Core Course**				
Course Title	**Conduction and Radiation**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**2**	**4**	

Conduction- Fourier’s law of heat conduction, initial and boundary conditions, steady and unsteady heat conduction problems and their solutions in cartesian, cylindrical and spherical coordinates, separation of variables method, method of superposition, bessel’s equation and bessel functions, semi-infinite media, laplace transform, approximate analytical solution, conduction with phase change- integral method, solidification and melting - numerical methods, radiation- laws of radiation, intensity of radiation, irradiation, radiosity, radiative properties of surfaces, radiation exchange between surfaces, view factor, radiation exchange in a black enclosure, radiative heat transfer in participating media (gas radiation), radiative transfer equation.

Text Books Recommended

1. D W Hahn, and M N Ozisik, Heat Conduction, John Wiley & Sons, 3rd Edition, 2012.
2. M F Modest, Radiative Heat Transfer, Academic Press, 3rd Edition, 2013.

References

3. Analysis of heat and mass transfer by Eckert and Drake, McGraw-Hill
4. F P Incropera, D P Dewitt, T L Bergman, and A S Lavine, Incropera’s Principles of Heat and Mass Transfer, Wiley, 2018
5. V S Arpaci, Conduction Heat Transfer, Addison-Wesley, Reading, MA, 1966.
6. J R Howell, M P Menguc, and R Siegel, Thermal Radiation Heat Transfer, CRC Press, 6th Edition, 2015.

Course Code	**HSM_DE203**				
Course category	**Humanities and Social Sciences including Management**				
Course Title	**Project Management**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**0**	**0**	**2**	

Project, project management, programmes and portfolios, project life cycle (*PLC*), project life cycle phases, characteristics of *PLC*, *PLC* approaches, conceptualize phase, need analysis, business case, project charter, stakeholder management, project management plan, scope management, work breakdown structure, time management, network schedule, precedence diagram, critical path method (*CPM*), Gantt charts, *PERT*, resource histogram, cost management, estimation technique, cost baseline, estimation budget, quality management, quality assurance, planning and control, quality tools, interface, organizational structure, roles and responsibility, risk and opportunity management, risk identification, assessment response control and tools, communication and information management, barriers to communication, managing information, procurement and contract management, procurement guidelines and steps, contract administration, earned value management system, schedule variance, cost variance, change management, configuration management, problem solving, team performance, leadership, motivation and conflict management, health, safety, environment, corporate social responsibility (*CSR*), integrate, deliver and closeout.

Text Books Recommended

1. H Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 13th Edition, 2022

References

1. A Shtub, Project Management: Processes, Methodologies, and Economics, Pearson, 3rd Edition, 2017.

Course Code	**PEC1C_DE204**				
Category	**Professional Elective Courses**				
Course Title	**Computer Aided Engineering Design**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**2**	**4**	

Computer graphics fundamentals- transformations, projections; parametric curves, differential geometry of curves, hermite (*PC*), bezier and *B*-spline curves, parametric surfaces, differential geometry of surfaces, differential geometry of ruled and developable surfaces, Ferguson, coon's, Bezier and B-spline surface patches, sweep and cylindrical surfaces, composite surface, representation of solids: cellular decomposition models, B-rep and *CSR* models, parametric instancing and sweep, *CG*, mass & geometrical properties, data transfer, *CAD* for *FEA*, design optimization and *CAM*, recent trends, reverse engineering and rapid manufacturing.

Text Books Recommended

1. I. Zeid, *CAD/CAM theory and practice*. McGraw-Hill Higher Education, 1991.

References

1. J. Brown, *Computer Aided Engineering and Design*. New Age International Private Limited.
2. D. F. Rogers, "Mathematical elements for computer graphics," *McGraw Hill, USA*, 1990.
3. K. Lee, *Principles of CAD/CAM/CAE Systems*. 1999.

4. D. L. Ryan, "Computer-Aided Graphics and Design," *Comput. Graph. Des.*, Dec. 2018.
5. M. E. Mortenson and M. E. Mortenson, "Mathematics for computer graphics applications," p. 354, 1999.
6. M. E. Mortenson, *Geometric modeling*. Industrial Press, 2006.
7. P. N. Rao, "CAD/CAM.," p. 785, 2010, Accessed: Nov. 08, 2021.

Course Code	**PEC2C_DE204**				
Course Category	**Professional Elective Courses**				
Course Title	**Fracture Mechanics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**0**	**3**	

Fracture- an overview, theoretical cohesive strength, defect population in solids, stress concentration factor, notch strengthening, elements of fracture mechanics, Grifiths crack theory, stress analysis of crack, energy and stress field approaches, plane strain and plane stress fracture toughness testing, crack opening displacement, elastoplastic analysis, J-integral, ductile-brittle transition, impact energy fracture toughness correlation, microstructural aspects of fracture toughness, environmental assisted cracking, cyclic stress and strain fatigue, fatigue crack propagation, analysis of engineering failures.

Text Books Recommended

Ted.L. Anderson, "Fracture Mechanics: Fundamentals and Applications," *CRC Press*, 2017.

References

K. P. Prashant Kumar, *Elements of Fracture Mechanics*. Tata McGraw Hills, 2009.

Course Code	**PEC3C_DE204**				
Course Category	**Professional Core Course**				
Course Title	**Convective Heat Transfer**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**2**	**4**	

Conservation equations, boundary layers, free convection, forced convection, heat transfer in laminar and turbulent, internal as well as external flows, mixed convection, combined convection and radiation, boiling and condensation, molecular diffusion in fluids, mass transfer coefficient, simultaneous heat and mass transfer, applications.

Text Books Recommended

1. P. H. Oosthuizen and D. Naylor, *An introduction to convective heat transfer analysis*. McGraw-Hill Science, Engineering & Mathematics, 1999.

References

1. W. M. Kays, *Convective heat and mass transfer*. Tata McGraw-Hill Education, 2011.

2. H. Schlichting and J. Kestin, *Boundary layer theory*, vol. 121. Springer, 1961.

Course Code	**OEC1_DE205**				
Category	**Open Elective Courses**				
Course Title	**Computational Methods in Engineering**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**2**	**4**	

Formulation and solution of linear system of equations, Gauss elimination, *LU, QR* decomposition, iteration methods (Gauss-Seidal), convergence of iteration methods, singular value decomposition and the sensitivity of rank to small perturbation, Newton's divided difference, interpolation polynomials, Lagrange interpolation polynomials non-linear regression, multiple linear regression, general linear least squares, vector spaces, basis vectors, orthogonal/ unitary transform, Fourier transform, Laplace transform, local and global minima, line searches, steepest descent method, conjugate gradient method, quasi Newton method, penalty function, graphs and matrices, simple graph, cyclic graph, complete graph, properties of the Laplacian matrix and relation with graph connectivity non-negative matrices. applications of graph theory to engineering problems.

Text Books Recommended

1. Steven C. Chapra and Raymond P. Canale "Numerical Methods for Engineers", , McGraw Hill

References

1. Hines and Montrogmery, John"Probability and Statistics in Engineering and Management Studies",
2. R. B. Bapat "Graphs and Matrices", , TRIM Series, Hindustan Book Agency, 2011.

Course Code	**OEC2_DE205**				
Course Category	**Open Elective Course**				
Course Title	**Cost Management of Engineering Projects**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**0**	**3**	

Introduction and overview of the strategic cost management process cost concepts in decision-making, relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system, inventory valuation, creation of a database for operational control, provision of data for decision-making, project, meaning, different types, why to manage, cost overruns centres, various stages of project execution, conception to commissioning, project execution as a conglomeration of technical and nontechnical activities, detailed engineering activities, pre project execution main clearances and documents project team: role of each member, importance project site, data required with significance. project contracts, types and contents, project execution, project cost control, bar charts and network diagram, cost behavior and profit planning marginal costing, distinction between marginal costing and absorption costing, break-even analysis, cost-volume-profit analysis, various decision-making problems, standard costing and variance analysis, pricing strategies, Pareto analysis, target costing, life cycle costing, cost of the service sector, just-in-time approach, material requirement planning, enterprise resource planning, total quality management and theory of constraints, activity-based cost management, benchmarking; balanced scorecard and value-chain analysis. budgetary control, flexible budgets, performance budgets, zero-based budgets, measurement of divisional profitability pricing decisions including transfer pricing, quantitative techniques for cost management.

Text Books Recommended

R. S Kaplan Anthony A. Alkinson, Management & Cost Accounting, Pearson, 3rd Ed.

References

C. T. Horngren , G Foster, S. M. Datar, M. V. Rajan, C. M. Ittner, Cost Accounting A Managerial Emphasis Prentice Hall, 13th Ed.

N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill/ 4th Ed.

Course Code	**OEC3_DE205**				
Course Category	**Open Elective Courses**				
Course Title	**Artificial intelligence and Machine Learning**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester - 2 (Two)**
	2	**1**	**2**	**4**	

Introduction to artificial intelligence (*AI*) and machine learning (*ML*), overview of Python & introduction to Python packages NumPy, pandas, matplotlib, Seaborn, Scikit-Learn, real world *AI*, odds and probability, the Bayes rule, introduction to Naïve Bayes classification, supervised and unsupervised machine learning, reinforcement learning, Introduction to pre-processing techniques, model overfitting and underfitting, intuitive understanding of the Naïve Bayes classification, Implementation of Naïve Bayes Classification using Python- Scikit-Learn, intuitive understanding of the linear regression, visualizing linear regression, machine learning applications of linear regression, Implementation of nearest neighbor classifier using Python- Scikit-Learn, intuitive understanding of the logistic regression as classifier, Implementation of Logistic regression using Python— Scikit-Learn, intuitive understanding of the nearest neighbor classifier, Implementation of Nearest Neighbor classifier using Python-Scikit-Learn, elements of a neural network, perceptron, simple neural network classifier, implementation using Python-Scikit-Learn, brief introduction to deep learning, support vector machine (*SVM*), mathematical formulation of *SVM*, Implementation of *SVM* for classification and regression using Scikit-Learn.

Text Books Recommended

1. Andreas C. Muller & Sarah Guido O'Reilly, Introduction to Machine Learning with Python

References

1. Aurélien Géron O'Reilly, Hands on Machine Learning with Scikit-Learn and TensorFlow
2. Sanders, Finn, Python Machine Learning for Beginners: Handbook for Machine Learning, Deep Learning and Neural networks Using Python, Scikit-Learn and Tensor Flow