

SGGS Institute of Engineering and Technology, Vishnupuri, Nanded
Department of Production Engineering

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**Ph. D. Course work for candidates registered in 09-2010 and 2010-2011 for
 Paper-3 and Paper-4**

Sr. No.	Registration No.	Name of the candidate	Name of the Guide(s)	Subject of Ph. D.	Title of Paper-3	Title of Paper-4	Year of Registration
1.	2009PPROD001	Mr. Baviskar P. V.	Dr. V.B. Tungikar	Study and analysis of crack in rotor shaft of industrial fans using vibration techniques	Advanced machine Design	Computer aided analysis	2009
2	2010PPROD001	Mr. Ingle S.S.	Dr. V.M. Nandedkar	Comparison of Emission and Performance of two Biodiesel fuels in Direct Injection Compression Ignition Engine"	Internal combustion Engines	Bio energy Engineering	2010

ADVANCED MACHINE DESIGN

Solid mechanics: Analysis of stress and strain, multidimensional stress-strain relationship, plane strain, plane stress, and axisymmetric analysis. Introduction to elastic stability, energy methods, displacement method and force method

Analysis of plates: Introduction, Love-Kirchoff's theory, stress resultants. Deflection of plates, governing equation, support conditions. Laminated composite plates, first order shear deformation theory, higher order shear deformation theory, stress- strain relationships.

Transient analysis: Introduction, single degree of freedom system, multi degree of freedom system, explicit schemes, and implicit schemes of solution.

Dynamic Analysis: Introduction, basic concepts of eigen value problems, basic properties of eigen values and eigen vectors, iterative methods, transformation methods, approximate methods, subspace iteration method.

Fracture mechanics: Introduction: Fracture mechanics approach to design, the energy criterion, the stress intensity approach, effect of material properties on fracture, dimensional analysis in fracture mechanics.

Fundamental concepts: Stress concentration effect of flaws, the Griffith energy balance, the energy release rate, instability and the R curve, stress analysis of cracks, K as a failure criterion.

Fracture toughness testing of metals: General considerations, K_{IC} testing, K-R curve testing, J testing of metals, CTOD testing.

Reference books

1. Advanced solid mechanics: **L.S. Srinath**, Tata McGraw Hill publishers.
2. Theory of plates and shells: **Timoshenko and Goodiar**, Tata McGraw Hill international.
3. Mechanics of composite materials: **R.M. Jones**, Wiley international
4. CAD and Design of machine elements: **M.A. Rao, R. Bhatt Rao**, New Age publishers.
5. Fracture mechanics, fundamentals and applications: **T.L. Anderson**, CRC Press, 2nd edition.

COMPUTER AIDED ANALYSIS

Finite Difference Method: Introduction, One dimensional and two dimensional problems, Boundary conditions, Method of solving simulations algebraic equations, Explicit method, Implicit method, Application of FDM to steady and unsteady heat conduction.

Finite Element Method: Introduction, Overview of FEM, Advantages and applications, recent advance in FEM, FEA software Basic principals and general procedure of FEM. Discretization, Bandwidth and its minimization, Interpolation models, Pascal triangle, Convergence requirements, Shape functions, variational and weighted residual methods for derivation of element characteristic matrix and vector, Rayleigh Ritz and Galerkin approach. Assembly of finite element equations, Application of boundary conditions, Solution techniques

Higher Order and Isoparametric Elements: Natural Coordinates, Higher Order elements in terms of Natural Coordinates and Classical Interpolation Polynomials, Isoparametric elements, 2D elements, Computation of element stiffness matrix, Gauss quadrature, Convergence criteria.

Formulation of Plate Bending Elements: Introduction to CPT, FSDT, HSDT and formulation of rectangular elements, Application to composite laminated plates.

Applications: FEA to fluid mechanics and heat transfer

Reference Books

1. "Text Book Of Finite Element Analysis", **P. Seshu**, PHI Publishing, 2003
2. "Finite Element Procedures, **K. J. Bathe** PHI Publishing, 1997
3. "The Finite Element Method in Engineering" **S.S. Rao**, Pergamon Press.
4. "Finite Element Method", **J.N. Reddy**, McGraw Hill Int.
5. "Heat Transfer a Basic Approach", **Ozisk M. N.**, McGraw Hill Int. edition 1985

Internal Combustion Engines

i) Measurement & Testing: Introduction ,engine performance parameters, measurement and testing, engine operating characteristics, performance maps

ii) Engine Materials: Various engine components, cylinder head, spark plug, gaskets, cylinder block, piston ,piston rings, gudgeon pin ,connecting rod, crankshaft, bearings ,crankcase ,fuel injector

iii) Engine Design: Preliminary analysis, cylinder number, size and arrangement, experimental development

iv) Electronic Injection System: Gasoline injection, EFI system, MPFI system , electronic control system ,injection timing, electronic diesel injection system and control

v) Engine Emissions & Control: Air pollution due to IC engines , norms ,engineemissions, HC, CO, NOx , particulates ,other emissions, emission control methods,exhaust gas recirculation ,modern methods, crankcase blow by

vi) Simulation Technique: Application of simulation technique for engine tuning, engineselection parameters, recent trends in IC engines

References

1. The Internal Combustion Engine in Theory and Practice Volume I & II by Charles Fayette Taylor, The MIT Press
2. Internal Combustion Engines- V Ganesan, 2nd edition, TaTa McGraw Hill
3. Automotive Technology, Jack Erjavec, 3rd edition, Delmar Thomson Learning
4. Design and Simulation of four stroke engines, Gordon P Blair, SAE International
5. Gasoline Engine Management, Bosch handbook, 2nd edition, Professional Engineering Publication.
6. Internal Combustion Engines, C.R. Ferguson & A.R. Kirkpatrick, Delhi, 2001
7. Internal Combustion Engines: Applied Thermosciences, 2nd Edition and Air Pollution, Edward F. Obert, 3rd Edition, Intext Educational Publishers, 1973.
8. Internal Combustion Engine Fundamentals, John Heywood, McGraw-Hill Inc., 1988.
9. Introduction to Combustion Phenomena, Volume 2, A. Murty Kanury Gordon and Breach Science Publishers, 1975.
10. M.L. Mathur and R.P. Sharma, "A course in Internal combustion Engine", Tata Mc Graw Hill Publishing house.

BIOENERGY ENGINEERING

Biomass Sources, Characteristics & Preparation: Biomass Sources and Classification. - Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses and other sources for fermentation ethanol-Sources and processing of oils and fats for liquid fuels- Energy plantations -Preparation of woody biomass: Size reduction, Briquetting of loose biomass, Drying, Storage and Handling of Biomass.

Biogas, Technology: Feedstock for biogas production, Aqueous wastes containing biodegradable organic matter, animal residues. Microbial and biochemical aspects- Operating parameters for biogas production. Kinetics and mechanism - Dry and wet fermentation. Digesters for rural application - High rate digesters for industrial waste water treatment. Bio-Ethanol and Bio-Diesel Technology: Production of Fuel Ethanol by Fermentation of Sugars. Gasohol as a Substitute for Leaded Petrol. - Trans-Esterification of Oils to Produce Bio-Diesel.

Pyrolysis and Gasification of Biomass: Thermo-chemical conversion of ligno-cellulose biomass - Biomass processing for liquid fuel production - Pyrolysis of biomass - Pyrolysis regime, effect of particle size, temperature, and products obtained. Thermo-chemical gasification principles: Effect of pressure, temperature and of introducing steam and oxygen. Design and operation of Fixed and Fluidized Bed Gasifiers.

Combustion of Biomass and Cogeneration Systems: Combustion of Woody Biomass: Theory, Calculations and Design of Equipments. Cogeneration in Biomass Processing Industries. Case Studies: Combustion of Rice Husk, Use of Bagasse for Cogeneration.

REFERENCES

1. D.D.Hall and R.P.Grover, Biomass Regenerable Energy, John Wiley, New York, 1987.
2. R D Begamudre, Energy Conversion Systems, New Age International (P) Ltd., Publishers, New Delhi, 2000.
3. G.D. Rai, Non-Conventional Sources of Energy, Khanna Publishers, New Delhi
4. D.S. Chauhan, S.K. Srivastava, Non-Conventional Energy Sources, New Age International (P) Limited Publishers.
5. B.H. Khan, Non-Conventional Energy Resources, Tata McGraw-Hill Publishing Company Limited New Delhi.