JGI JAIN DEEMED-TO-BE UNIVERSITY | FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING
M.Tech. – Energy and Environmental Management
Syllabus PG Entrance Test
JET 2022

1. BASIC AND APPLIED THERMODYNAMICS

Basic concepts, Heat and work. Zeroth, First, Second and Third Law – assertions and applications. Real and Ideal gases. Standard vapor, Gas power and Refrigeration cycles, Psychrometry.

2. HEAT TRANSFER

Modes of heat transfer. Heat dissipation from extended surfaces, Heat exchangers, free and forced Convection, Black body and basic concepts in Radiation.

3. FLUID MECHANICS AND FLUID MACHINERY

Basic Concepts, Pressure and its measurement, forces on immersed surfaces, Buoyancy, stability of floating bodies, Kinematics and Dynamics. Applications of Bernoulli's equation, Dimensional analysis, Similitude and modeling.

4. ELECTRICAL ENGINEERING

Ohm's law – Kirchoff's law – A.C. circuits – D.C. machines – Transformers – Synchronous machines – Instrumentation.

5. RENEWABLE ENERGY RESOURCES

Role and potential of new and renewablesources–Solar energy and its potentials, Solar collectors - Flat plate and concentrating collectors,Solar thermal applications, solar PV and design. Wind energy- horizontal and vertical axis windmills, performance characteristics, Betz criteria- OTEC, Principle's utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques,

6. MACHINE DESIGN

Design of Joints, couplings, clutches, belt drives, power screws. Design of Power transmission systems: gears and gear drives shaft and axle.

7. STRENGTH OF MATERIALS

Stress and strain, bending moment and shear force diagram, bending stresses and deflection of beams. Torsion of shafts, helical springs. Combined stresses, thick-and thin-walled pressure vessels.

8. ENGINEERING MATERIALS

Basic concepts on structure of solids. Crystalline materials, Binary phase diagrams. Structure and properties of common engineering materials. Heat treatment of steels. Plastics, Ceramics and composite materials.

9. PRODUCTION ENGINEERING

Metal Forming, Metal Casting, Fabrication Processes, Metal Cutting, Cutting Tools Materials.

REFERENCE TEXT BOOKS:

1. Nag, P. K. (2013). *Engineering thermodynamics*. Tata McGraw-Hill Education.
2. Kothandaraman, C. P. (2004). *Heat and mass transfer data book*. New age international.
3. Agrawal, A. S. (2001). *Fluid Mechanics and Machinery*. Tata McGraw-Hill Education.
4. Bakshi, U. A. (2020). *Basic electrical engineering*. Technical Publications.
5. Rai G.D(2011). *Non-Conventional Energy Sources*Khanna Publishers.
6. Lingaiah, K. (2003). *Machine design databook*. McGraw-Hill Education.
7. Rajput, R. K. (2006). *Strength of Materials: Mechanics of Solids*. S. Chand Limited.
8. Callister, W. D., &Rethwisch, D. G. (2011). *Materials science and engineering* (Vol. 5, pp. 344-348). NY: John wiley& sons.
9. Sharma, P. C. (1999). *A textbook of production engineering*. S. Chand Publishing.