ADVANCED MECHANICAL COMPONENT DESIGN

Course Code:15ME2209 **L P C**
3 0 3

Course Outcomes: At the end of the course, the student will be able to

CO1: explain the mechanical behavior under creep.
CO2: assess the fracture, crack modes stress intensity factor.
CO3: design and analysis of components of pressure vessels.
CO4: design of thick walled high pressure vessels.
CO5: prescribe the design of gear box; explain the kinematic arrangement.

UNIT-I (10-Lectures)

Creep: Material behavior**,** stages of creep, creep strength, relaxation, mathematical modeling of creep behavior-Maxwell model, Voigt-Kelvin Model.

UNIT-II (10-Lectures)

Fracture: Introduction, **c**rack modes**, s**tress intensity factor, fracture toughness, plastic zone correction, *J*-Integral**.**

UNIT-III (10-Lectures)

Design of cylindrical and spherical vessels: Thin and thick walled cylinder analysis, design of end closers, design of standard and non-standard flanges, design of vessels, design of supports for process vessels.

UNIT-IV (10-Lectures)

Design of thick walled high pressure vessels: Design by various theories of failure, construction of these vessels with high strength steel and other special methods.

UNIT-V (10-Lectures)

Design of gearbox: Component of speed reducers, multi speed gear box, speed changing, speed diagrams, kinematic arrangement, design of gear box.

TEXT BOOKS:

1. P. Gope, "*Machine design*" ,1e, PHI, 2012
2. M.V. Joshi and V V Mahajani, "*Process Equipment Design*" , 2e, Mc-Millan India Ltd.,3e,2008
3. T V Sundrarajamurthy and Shanmugam, "*Machine Design*" , 8e, Anuradha Publications, 2007

REFERENCES:

1. John, V. Harvey, "*Pressure Vessel Design: Nuclear and Chemical Applications*", Affiliated East West Press Pvt. Ltd., 1969
2. Prasanth Kumar, "*Elements of Fracture Mechanics*", Wheeler Publishing, New Delhi-1999