ADVANCED MECHANICAL COMPONENT DESIGN

Subject Code: 13ME2210

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Course Outcomes:

At the end of the course, the student will be able to

CO1: Explain the mechanical behaviour 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

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

UNIT-II

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

UNIT-III

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

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

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.