**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
**KAKINADA – 533 003, Andhra Pradesh, India**
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

| I Year II Semester | | L | T | P | C |
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| **BASIC CIVIL AND MECHANICAL ENGINEERING** | | | | | |

**Course Objectives**:

COB 1: To impart basic principles of stress, strain, shear force and bending moment.
COB 2: To teach principles of strain measurement using electrical strain gauges.
COB 3: To impart basic characteristics of building materials.
COB 4: To familiarize the sources of energy, power plant economics and environmental aspects.
COB 5: To make the students to understand the basics concept of Boilers & I.C. engines.

**Course Outcomes:**

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

CO 1 : Apply Shear force diagram & Bending moment diagram principles for Cantilever and Simply supported beams.
CO 2 : Apply concepts of Rosette analysis for strain measurements.
CO 3 : Analyse the characteristics of common building materials.
CO 4 : Compare the working characteristics of Internal Combustion engines.
CO 5 : Compare the differences between boiler mountings and accessories.

**Mapping of Course Outcomes with Program Outcomes**

| CO/PO | PO 1 (K3) | PO 2 (K4) | PO 3 (K5) | PO 4 (K3) | PO 5 (K3) | PO 6 (K3) | PO 7 (K2) | PO 8 (K3) | PO 9 (K2) | PO 10 (K2) | PO 11 (K3) | PO12 (K) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1 (K3)** | 3 | 2 | - | - | - | - | 2 | - | - | - | - | - |
| **CO2 (K3)** | 3 | 2 | - | - | - | - | 3 | - | - | - | - | - |
| **CO3 (K4)** | 3 | 3 | - | - | - | - | 3 | - | - | - | - | - |
| **CO4 (K4)** | 2 | 3 | - | - | - | - | 3 | - | - | - | - | - |
| **CO5 (K4)** | 3 | 3 | - | - | - | - | 3 | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes**

| CO / PSO | PSO 1(K5) | PSO 2(K5) | PSO 3(K3) |
|---|---|---|---|
| **CO1 (K3)** | - | - | - |
| **CO2 (K3)** | - | 1 | - |
| **CO3 (K4)** | - | 2 | - |
| **CO4 (K4)** | - | - | - |
| **CO5 (K4)** | - | 2 | - |

**UNIT – I**:

Basic Definitions of Force –Stress –Strain –Elasticity. Shear force – Bending Moment Torsion . Simple problems on Shear force Diagram and Bending moment Diagram for cantilever and simply supported beams.

**UNIT – II:**

Measurement of Strain - Electrical Capacitance and Resistance Strain gauges multi channel strain indicators. Rosette analysis Rectangular and Triangular strain rosettes.

**UNIT – III**:

Characteristics of common building materials – Brick – Types Testing; Timber Classification Seasoning Defects in Timber; Glass Classification uses; steel and its applications in construction industry.

**UNIT IV**

**Hydraulic Turbines and Pumps:**

Introduction to Power transmission tools, Hydraulic Turbines: Classification-Difference between Impulse and Reaction Turbine.
Pumps: Classification of Pumps, Centrifugal Pump-Applications-Priming-Reciprocating Pumps, Single Acting & Double acting-Comparison with Centrifugal Pump

**UNIT V**

**I.C Engine:** Heat Engine – Types of Heat Engine–Classification of I.C. Engine-Valve Timing Diagram, Port Timing Diagram- Comparison of 2S & 4S Engines- Comparisonof Petrol Engine and Diesel Engine-Fuel System of a Petrol Engine-Ignition Systems.
**Boilers:** Classification of Boilers – – Simple Vertical Boiler – Cochran Boiler – Babcock and Wilcox Boiler Benson Boiler Difference between Fire Tube and Water Tube Boilers Boiler Mountings and Accessories.

**Text Books:**

1. Basic Civil and Mechanical Engineering, by Prof. V. Vijayan, Prof. M. Prabhakaran and Er. R. Viashnavi, 2nd edition, S. Chand Publication, 2010
2. Elements of Mechanical Engineering, Fourth Edition, S. Trymbaka Murthy, University Press, 2014
4. Shanmugam G and Palanichamy M S, Basic Civil and Mechanical Engineering, Tata McGraw Hill Publishing Co., New Delhi, (1996).
5. Ramamrutham S., Basic Civil Engineering, Dhanpat Rai Publishing Co. (P) Ltd. (1999).

**Reference Books:**

1. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, (2005).
2. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, (2000).
3. Er. R. Vaishnavi, Basic Civil and Mechanical Engineering, 2/e, S.Chand Publications (2003)

**Web Links:**

1. http://www.umich.edu/~nppcpub/resources/compendia/ARCHpdfs/ARCHsbmIntro.pdf
2. http://www.hillagric.ac.in/edu/coa/agengg/lecture/243/Lecture%203%20Engine.pdf