Techno India NJR Institute of Technology

Material Testing Lab

(4CE4-21)

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For Techno India NJR Institute of Technology
पंकज पोरवाल
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(Principal)

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year-IV Semester: B.Tech. (Civil Engineering)

4CE21: MATERIAL TESTING LAB

Credit: 01 **Max. Marks: 50 (IA:30, ETE:20)**

0L+0T+2P

1. Tests on Mild steel and HYSD Bar –To determine compressive and tensile strength, yield strength, percentage elongation etc.
2. Tests on Cement and concrete cubes/ core to establish their strength
3. Hardness Test – Rockwell Hardness and Brinell Hardness
4. Impact Test – Izod and Charpy
5. Modulus of Rupture of Wooden Beam
6. Fatigue Test
7. Spring Test
8. Torsion Test

Course Overview:

The mechanical response of materials to different external loadings is of great importance to many fields of science, engineering, and industry. Structural failure is realized when the functionality of engineering components has been depleted. In general, there are three main reasons for a component to become dysfunctional—excessive (elastic or inelastic) deformation, fracture, and wear. Excessive elastic deformation is controlled by the elastic properties of the material, such as elastic modulus, and may occur under loading conditions of stable equilibrium (e.g., excessive deflection of a beam), unstable equilibrium (e.g., buckling of a column), and brittle fracture. Excessive inelastic deformation depends on plastic material properties, such as ultimate tensile strength, strain hardening, and hardness, and may occur under loading conditions conducive to fatigue (a process involving alternating stresses (or strain) that induce crack initiation from stress raisers or defects in the material followed by crack growth), ductile fracture due to excessive accumulation of plastic deformation, and creep (a time-dependent deformation process encountered with viscoelastic materials and elastic-plastic materials at elevated temperatures subjected to a constant stress). Material degradation may also occur as a result of mechanical wear arising at contact interfaces of load-bearing components when the transmitted contact stresses are comparable of the material hardness. It is therefore important to not only know how the mechanical properties control the material response to a certain external force, but also have knowledge of standard mechanical testing methods for measuring different material properties.

Course Outcomes:

CO.NO.	Cognitive Level	Course Outcome
1	Knowledge	Determine the compressive and tensile strength of steel and HYSD bar.
2	Application	Determine the strength of cement and concrete cubes.
3	Comprehension	Determine the hardness and impact of distinct materials.
4	Application	Explain basic material's properties like fatigue, torsion, modulus of rupture etc.
5	Synthesis	Explain the characteristics involved in finalizing the selection of material for a specific work.

Prerequisites:

1. Fundamentals Knowledge of Different types of Properties of Materials

Course Outcome Mapping with Program Outcome:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO247.1	2	2	2	2	0	1	1	0	0	0	0	1	1	1	1
CO247.2	2	2	2	2	1	1	0	0	0	1	0	0	1	1	1
CO247.3	2	2	2	1	2	2	2	2	1	1	2	1	1	1	1
CO247.4	3	3	3	3	2	1	2	1	1	1	1	2	2	2	1
CO247.5	3	2	3	2	2	1	2	2	1	2	1	2	2	2	1
CO247 (AVG)	2.4	2.2	2.4	2	1.4	1.2	1.4	1	0.6	1	0.8	1.2	1.4	1.4	1

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Course Coverage Module Wise:

Lab No.	Experiments List According to RTU Syllabus
1	Tests on Mild steel and HYSD Bar –To determine compressive and tensile strength, yield strength, percentage elongation etc.
2	Tests on Cement and concrete cubes/ core to establish their strength
3	Hardness Test – Rockwell Hardness and Brinell Hardness
4	4. Impact Test – Izod and Charpy
5	Modulus of Rupture of Wooden Beam
6	Fatigue Test
7	Spring Test
8	Torsion Test

Faculty Lab Manual

https://r.search.yahoo.com/_ylt=AwrxzMyauKxhVycA2hO7HAx.;_ylu=Y29sbwNzZzMEcG9zAzIEdnRpZAMEc2VjA3Ny/RV=2/RE=1638738202/RO=10/RU=https%3a%2f%2fiitk.ac.in%2fme%2fmaterial-testing-laboratory/RK=2/RS=e9G7vnNuKpAoqiahoNkOoDohtzg-

Viva QUIZ Link

https://r.search.yahoo.com/_ylt=Awrxwv7wuaxhjQ8A9Ua7HAx.;_ylu=Y29sbwNzZzMEcG9zAzEEdnRpZAMEc2VjA3Ny/RV=2/RE=1638738545/RO=10/RU=https%3a%2f%2fwww.proprofs.com%2fquiz-school%2fstory.php%3ftitle%3dengineering-materials-and-

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Assessment Methodology:

1. Practical exam Based on Experiments.
2. Internal examsand Viva Conduct.
3. Final Exam (practicalpaper) at the end of the semester.

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