

RAGHU ENGINEERING COLLEGE

AUTONOMOUS (Approved by AICTE, New Delhi, & Permanently Affiliated to JNTU-GV, Vizianagaram)

NBA & NAAC A+ grade Accredited institute Dakamarri, Bheemili Mandal, Visakhapatnam Dist. – 531 162 (A.P.)

Phone: +91-8922-248001, 248002, 9963981111, www.raghuenggcollege.com

INSTITUTE VISION

Envisioning to be a world class technical institution by synergizing quality education with ethical values.

INSTITUTE MISSION

- To encourage training and research in cutting-edge technologies.
- To develop and strengthen strategic links with the industry.
- To kindle the zeal among the students and promote their quest for academic excellence.
- To encourage extra-curricular activities along with good communication skills.

QUALITY POLICY

RAGHU Engineering College underscores ethical values along with innovative teaching through an interactive, activity-based pedagogy, establishes the best of infrastructural facilities, inculcates engineering temper among the students through the use of the latest Information and Communication Technologies and strives for an efficient, responsive and transparent administration in all areas

Department of Civil Engineering

VISION

To become a pioneer in the field of civil engineering by providing high quality education and research to serve the public consistently with competitive spirit professional ethics.

MISSION

- M1: Provide quality knowledge and advance skills to the students in order to expertise theoretically and practically in the areas of civil engineering.
- M2: Improve the professional potentiality of the students and staff through educational programs to expand the knowledge in the field of civil engineering
- M3: Inculcate healthy competitive spirit towards the higher education and successful career in the field of civil engineering to serve the nation ethically.

PROGRAMME EDUCTIONAL OBJECTIVES(PEOs)

- **PEO 1**: Employ a practicing civil engineer in construction, design, testing, and allied fields.
- PEO 2: Engaging in self-directed learning research or undertaking higher studies in the rapidly changing civil engineering environment.
- PEO 3: Create new methods/processes to meet the needs of society with their civil engineering knowledge.

MAPPING OF MISSION STATEMENTS WITH PEOS

MS/PEO	PEO 1	PEO 2	PEO 3
MS 1	3	3	2
MS 2	3	3	2
MS 3	3	3	2

1-Slight, 2- Moderate, 3- Substantial

PROGRAM OUTCOMES						
	Graduates of Civil Engineering Will:					
PO 1	Engineering knowledge : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.					
PO 4	Conduct investigations of complex problems : Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.					
PO 7	Environment and sustainability : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.					
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					
PO 9	Individual and team work : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					

PO 10	Communication: Communicate effectively on complex engineering activities with the
	engineering community and with society at large, such as, being able to comprehend
	and write effective reports and design documentation, make effective presentations, and
	give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the
	engineering and management principles and apply these to one's own work, as a
	member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to
	engage in independent and life-long learning in the broadest context of technological
	change.
	PROGRAM SPECIFIC OUTCOMES (PSOs)
PSO 1: A	Analyze, design and execute the civil engineering structures with good knowledge in
engineeri	ng, mathematics & basic sciences.
PSO 2: 1	Follow the economic, environmental and safety factors involved in the construction
industry.	

Mapping of PEOs with POs and PSOs

PEO/PO	PO- 1	PO- 2	РО- 3	РО- 4	PO- 5	PO- 6	PO- 7	PO- 8	РО- 9	PO- 10	РО- 11	PO- 12	PSO- 1	PSO- 2
PEO 1	3	3	3	2	3	2	2	2	3	3	3	3	3	3
PEO 2	3	3	3	2	3	2	2	1	3	3	3	3	3	2
PEO 3	3	3	3	3	3	1	1	1	2	3	2	3	3	2

1-Slight, 2- Moderate, 3- Substantial

2301101 – STRENGTH OF MATERIALS											
Civil Engineering											
Programme	B.Tech & CIVIL	Sem	Category	L	Т	Р	Credit				
&Branch											
Prerequisites	Engineering	3	PC	3	0	0	3				
	mechanics										
Course Objectives :											
1. To impart preliminary concepts of Strength of Material and Principles of Elasticity and											
Plasticity S	Plasticity Stress strain behaviour of materials and their governing laws.										
2. To give co	oncepts of stresses deve	eloped in th	ne cross section a	nd bendin	g equa	ations c	alculation				
of section	modulus of sections w	vith differen	nt cross sections								
3. To give co	oncepts of Principal str	esses and	strains on any inc	lined plan	e and t	o impa	rt concepts				
of failures				-		-	-				
4. To give co	ncepts of torsion and d	esign the c	ross section whe	n subjected	dto loa	ding					
5. To classif	y columns and calcula	ation of loa	ad carrying capa	city and t	o asse	ss stre	ssesand to				
classify cy	linders based on their	thickness a	and to derive equ	ations for	measu	rement	of stresses				
across the	cross section when sub	jected to ex	ternal pressure								
Preamble :	Strength of Materia	ls is a fu	ndamental subje	ect that e	xplore	es how	different				
	materials respond to	various for	rces and stresses.	This field	l equir	os engi	neers with				
	the knowledge to an	alvze and o	lesign structures	capable o	of with	standi	ng applied				
	loads. By studying	concepts s	such as stress, si	train and	defor	nation	safe and				
	effective engineering	solutions	can be develope	d.	actor	nution	, sure una				
Course Contents:	enteenteensmeering	, 501410115		а.							
Unit-1	Simple Stresses & St	rains and	Strain Energy		Cont	act Ho	urs: 9				
Elasticity And Pla	asticity - Types Of Str	esses and S	Strains - Hooke's	Law, Stre	ess Str	ain Dia	gram For				
Mild Steel, Workin	ng Stress, Factor Of Sat	fety, Latera	l Strain, Poisson's	Ratio & V	Volum	etric St	rain -				
Elastic Moduli &	Relationship Between	Them - Bar	s Of Varying Sec	tions - The	ermal	Stresse	s, Strain				
Energy - Gradual,	Sudden, Impact and Sh	ock Loadir	igs.				,				
Unit-2	Shear Force & Ben	ding Mom	ent		Cont	act Ho	urs: 9				
Definition of bear	ns – Types of beams –	Concept of	of shear force and	bending	mome	nt - S.	F and B.M				
diagrams for car	ntilever, simply supp	orted and	overhanging be	eams sub	jected	to po	int loads,				
uniformly distrib	uted loads, uniformly	varying l	oads and combin	nation of	these	loads -	– Point of				
contraflexure – R	elation between S.F.	B.M and ra	te of loading at a	a section o	of a be	am.					
Unit-3 Flexural Stresses and Shear Stresses Contact Hours: 9											
Flexural Stresses	: Theory Of Simple Ber	nding Assu	mptions, Derivati	on of Bend	ling Ed	quation	, Neutral				
Axis, Determinati	ion of Bending Stresse	es - Sectior	Modulus of Red	ctangular,	Circu	lar & I	Sections				
Shear Stresses: I	Derivation of shear stre	ess equatio	n - Shear Stress	Distributio	on Aci	ross Va	arious				
Beam Sections lil	ke Rectangular, Circul	ar, Triangu	ular and I Section	18.	~						
Unit-4	Principal Stresses &	Strains an	d Theories of Fa	ailures	Cont	act Ho	urs: 9				
Introduction — N	Normal & tangential	Stresses of	n an inclined p	lane for I	Bi-axia	al stres	ses - two				
perpendicular nor	mal stresses accompar	nied by a s	tate of simple sh	ear - Moh	r's cir	cle of s	stresses —				
graphical solutions.											

Interview of Function Function Controls of Function F
unit-strain unit of pure torsion — Derivation of Torsion equations -Assumptions made in the theory of pure torsion — Derivation of Torsion equations -Assumptions made in the theory of pure torsion — Derivation of Torsion equations -Assumptions made in the theory of pure torsion — Derivation of Torsion equations -Assumptions made in the theory of pure torsion — Derivation of Torsion equations -Assumptions made in the theory of pure torsion — Derivation of thrust Combined bending and torsion and end thrust Columns and Struts
Unit-5 Torsion of Circular Shafts Columns and Struts Contact Hours: 9 Torsion of Circular Shafts: Theory of pure torsion — Derivation of Torsion equations -Assumptions made in the theory of pure torsion — Torsional moment of resistance — Polar section modulus — Power transmitted by shafts — Combined bending and torsion and end thrust Columns and Struts
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torsion — Torsional moment of resistance — Polar section modulus — Power transmitted by shafts — Combined bending and torsion and end thrust Columns and Struts
Combined bending and torsion and end thrust Columns and Struts
Columns and Struts
Introduction — Types of columns —Axially loaded compression members — Crushing load — Euler's
theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end
conditions — Equivalent length of a column — slenderness ratio — Euler's critical stress — Limitations
of Euler's theory — Rankine — Gordon formula
Total Hours: 45
Text Books:
1 Strength of Materials by R.K Bansal, Lakshmi Publications
2 Strength of Materials by S. Ramamrutham
3 Mechanics of Materials- by R. C. Hibbler
Reference Books:
1 Strength of Materials by R.K.Rajput, S.Chand& Co, New Delhi
2 Strength of Materials by R. Subramanian, Oxford Publications
Web References :
1 https://www.youtube.com/watch
2 <u>https://onlinecourses.nptel.ac.in/noc24_ce76/preview</u>
COURSE OUTCOMES: BT Mapped
Upon completion of the course, students shall have ability to (Highest Level)
Understand the basic materials behavior under the influence of L2
different external loading conditions and support conditions
Draw diagram indicating the variation of key performance features L4
like bending moment and shear force
Understand bending stress& shear stress concepts for L2
CO 3 determination of stresses developed in the beams due to various
loading conditions
Understand the basic concepts of Principal stresses developed in a L2
CO 4 member when it is subjected to stresses along different axes and
applications of various theories of failures
Determine stresses in different engineering applications like L3
shafts, springs, subjected to different loading conditions and also
assess safe load over colums & struts under different loading
conditions

Mapping of Cos with POs and PSOs														
	PO-	PSO-	PSO-											
005/105	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	1	1	1	-	-	-	-	-	-	1	2	-
CO 2	3	2	1	1	1	-	-	-	-	-	-	1	2	-
CO 3	3	2	1	1	1	-	-	-	-	-	-	1	2	-
CO 4	3	2	1	1	1	-	-	-	-	-	-	1	2	-
CO 5	3	2	1	1	1	-	-	-	-	-	-	1	2	-
1 – Slight, 2 – Moderate, 3 – Substantial														

ASSE	ASSESSMENT PATERN - THEORY										
TES T	Rememberin g (K2)%	Understandin g (K2)%	Applyin g (K2)%	Analyzin g (K2)%	Evaluatin g (K2)%	Creatin g (K2)%	Total %				
MID											
-1											
MID											
-2											
SEE											
*± 3%	*± 3% may be varied										