

# SHRI VENKATESHWARA UNIVERSITY



## Syllabus

**M.TECH (VLSI) PART TIME**

**(Two Years Post Graduation Programme)**

**V SEMESTER**

**(w.e.f. 2019-20)**

**SCHOOL OF ENGINEERING &  
TECHNOLOGY**

SEMESTER-V													
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	WVI-053	Nano materials and Nanotechnology	3	0	0	20	10	30		70		100	3
2	WOE-555	Composite Materials	3	0	0	20	10	30		70		100	3
3	WVI-521	Dissertation Phase – I	0	0	20				125		125	250	10
		Total										450	16

## **Syllabus Contents:**

**Unit 1:** Nanomaterials in one and higher dimensions,

**Unit 2:** Applications of one and higher dimension nano-materials.

**Unit 3:** Nano-lithography, micro electro-mechanical system (MEMS) and nano-physics.

**Unit 4:** carbon nanotubes – synthesis and applications **Unit**

**5 and 6:** Interdisciplinary arena of nanotechnology.

**References:**

- Nanoscale Materials in Chemistry edited by Kenneth J. Klabunde and Ryan M. Richards, 2nd edn, John Wiley and Sons, 2009.
- Nanocrystalline Materials by A I Gusev and A A Rempel, Cambridge International Science Publishing, 1st Indian edition by Viva Books Pvt. Ltd. 2008.
- Springer Handbook of Nanotechnology by Bharat Bhushan, Springer, 3rd edn, 2010.
- Carbon Nanotubes: Synthesis, Characterization and Applications by Kamal K. Kar, Research Publishing Services; 1st edn, 2011, ISBN-13: 978-9810863975..

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Code	Course Name	L-T-P	Cr.
WOP -535	Composite Materials	3-0-0	3

### Syllabus & Content:

Unit No.	Content
1	<p><b><u>INTRODUCTION:</u></b>            Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.</p>
2	<p><b><u>REINFORCEMENTS:</u></b>            Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.</p>
3	<p>Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix.</p> <p>Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.</p>
4	<p>Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.</p>
5	<p>Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.</p>

**TEXT BOOKS:**

- Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
- Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

**References:**

- Hand Book of Composite Materials-ed-Lubin.
- Composite Materials – K.K.Chawla.
- Composite Materials Science and Applications – Deborah D.L. Chung.

- Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.