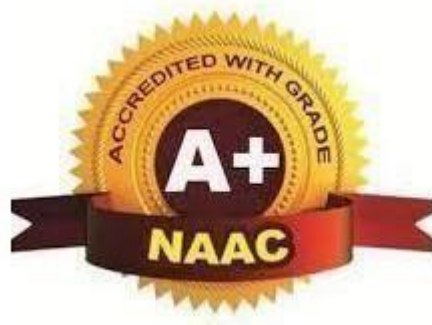




**TULSIRAMJI GAIKWAD-PATIL**  
**College of Engineering & Technology**

Mohgaon, Wardha Road, Nagpur - 441 108

**An Autonomous Institute**



**DEPARTMENT OF ELECTRONICS & COMMUNICATION  
ENGINEERING**

**B.Tech. Electronics & Communication  
Engineering**

**Syllabus**

**From**

**Academic Year 2022-23**

# Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur) Programme:  
Electronics & Communication Engineering

Scheme of Instructions: Fourth Year B.Tech. in Electronics & Communication Engineering

## Semester – VII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	PCC	BEC4701	Computer Communication Network	3	-	-	3	3	15	15	10	60	100
2	PCC	BEC4702	CMOS VLSI Design	3	1	-	4	4	15	15	10	60	100
3	PEC	BEC4703-5	Program Elective V	3	-	-	3	3	15	15	10	60	100
4	OEC	B\$XX01-16	Open Elective-III	3	-	-	3	3	15	15	10	60	100
5	OEC	B\$XX01-16	Open Elective-IV	3	-	-	3	3	15	15	10	60	100
6	OEC	B\$XX01-16	Open Elective-V	3	-	-	3	3	15	15	10	60	100
7	PCC	BEC4706	Computer Communication Network Lab	-	-	2	2	1	-	-	25	25	50
8	PCC	BEC4707	CMOS VLSI Design Lab	-	-	2	2	1	-	-	25	25	50
9	PROJ	BEC4708	Seminar	-	-	2	2	1	-	-	25	25	50
10	MCC	BAU4710	Innovations and Society	2	-	-	2	Audit	-	-	-	-	-
			<b>Total</b>	<b>20</b>	<b>1</b>	<b>6</b>	<b>27</b>	<b>22</b>	<b>90</b>	<b>90</b>	<b>135</b>	<b>435</b>	<b>750</b>

L- Lecture

T-Tutorial

P-Practical

CT1- Class Test 1

TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2

ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core Courses)	PEC (Programme Elective Courses)	OEC (Open Elective courses from other discipline)	Project / Seminar /Industrial Training	MCC (Mandatory Courses)
Credits	–	–	–	9	03	09	01	Yes
Cumulative Sum	05	24	24	47	12	06	04	–

**PROGRESSIVE TOTAL CREDITS : 123+22 =145**

  
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# Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur) Programme:  
Electronics & Communication Engineering

Scheme of Instructions: Second Year B.Tech. in Electronics & Communication Engineering

## Semester – VIII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	PROJ	BEC4801	Industry Based Project /Internship	-	-	26	26	13	-	-	75	75	150
2	PROJ	BEC4802	Comprehensive Viva-voce	-	-	-	-	4	-	-	-	100	100
3	HSMC2	BEC4803	Extra-Curricular Activities / Competitive Exam/Co-Curricular activities	-	-	4	4	2	-	-	100	-	100
4	MCC	BAU4808	Project Based Science, Technology Social Design and Innovation	2	-	-	2	Audit	-	-	-	-	-
			<b>Total</b>	<b>2</b>	<b>-</b>	<b>30</b>	<b>32</b>	<b>19</b>	<b>-</b>	<b>-</b>	<b>175</b>	<b>175</b>	<b>350</b>

L- Lecture

T-Tutorial

P-Practical

CT1- Class Test 1

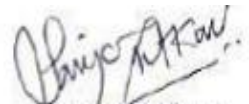
TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2

ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core Courses)	PEC (Programme Elective Courses)	OEC (Open Elective courses from other discipline)	Project / Seminar /Industrial Training	MCC (Mandatory Courses)
Credits	02	–	–	–	–	–	17	Yes
Cumulative Sum	05	24	24	56	15	15	05	–

**PROGRESSIVE TOTAL CREDITS : 145+19 =164**

  
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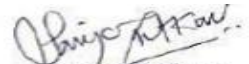
  
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Program Elective- I	Program Elective- II	Program Elective- III
Semester V	Semester V	Semester VI
<b>BEC3506</b> Digital System Design	<b>BEC3509</b> Introduction to MEMS	<b>BEC3603</b> Antenna and Microwave Engineering
<b>BEC3507</b> Embedded Systems	<b>BEC3510</b> Information Theory and Coding	<b>BEC3604</b> Optical Communication
<b>BEC3508</b> Power Electronics	<b>BEC3511</b> Biomedical Instrumentation	<b>BEC3605</b> Mechatronics
Program Elective-IV	Program Elective-V	
Semester VI	Semester VII	
<b>BEC3606</b> PLC SCADA	<b>BEC4703</b> Robotics & Automation	
<b>BEC3607</b> Wireless & Sensor Network	<b>BEC4704</b> Machine learning	
<b>BEC3608</b> Speech Processing	<b>BEC4705</b> Satellite Communication	



List of Open Elective					
Sr. No.	Course Code	Course Title	Sr. No.	Course Code	Course Title
1	BCSXX01	Cyber Law and Ethics	9	BMEXX09	Nanotechnology and Surface Engineering
2	BCSXX02	Block chain Technology	10	BMEXX10	Automobile Engineering
3	BITXX03	Cyber Security	11	BEEXX11	Power Plant System
4	BITXX04	Artificial Intelligence	12	BEEXX12	Electrical Materials
5	BECXX05	Internet of Things	13	BAEXX13	Avionics
6	BECXX06	Embedded Systems	14	BAEXX14	Unmanned Aerial Vehicles
7	BCEXX07	Introduction to Art and Aesthetics	15	BBTXX15	Biomaterials
8	BCEXX08	Metro Systems and Engineering	16	BBTXX16	Food and Nutrition Technology

  
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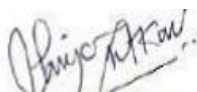
  
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<b>Fourth Year (Semester-VII) B.Tech.Electronics &amp; Communication Engineering</b>				
<b>BEC4701: Computer Communication Network</b>				
<b>Teaching Scheme</b>			<b>Examination Scheme</b>	
<b>Lectures</b>	3Hrs/week		<b>CT-1</b>	15 Marks
<b>Tutorial</b>	0Hrs/week		<b>CT-2</b>	15 Marks
<b>Total Credit</b>	3		<b>TA</b>	10 Marks
			<b>ESE</b>	60 Marks
			<b>Total</b>	100 Marks
		<b>Duration of ESE:03Hrs00Min.</b>		
<b>Course Outcomes (CO)</b>				
<b>Students will be able to</b>				
<b>1.Explain</b> the fundamentals of Computer Network and Network topologies.				
<b>2.Apply</b> flow control & Error control protocols of Data Link Layer with ARQ .				
<b>3.Illustrate</b> the concept of IP Addressing techniques and Routing protocols of Network Layer.				
<b>4.Analyze</b> the transport layer services, protocol Headers and congestion control protocols.				
<b>5.Determine</b> the function of Application Layer and Presentation layer protocols.				
<b>Course Contents</b>				
<b>Unit I</b>	Introduction to Networks, Network Topology, Network Devices Types of communication: - simplex, half duplex, full duplex, Network Classification:- LAN,MAN,WAN, Network Architecture, Protocols, OSI Reference Model, TCP/IP Reference Model. Transmission Media:-Guided Media, Unguided			
<b>Unit II</b>	Design Issues, Framing methods, Flow Control and Error Control, Stop-and-wait flow control Sliding-window flow control, Stop-and-wait ARQ, Go-back-N ARQ, Selective- repeat ARQ HDLC, MAC sub layer: ALOHA			
<b>Unit III</b>	Network layer duties, Routers, IP addressing and its classification, IPv4 address, IPv6 address Mask and Subnet, Routing algorithms like Shortest path routing, Dijkstra’s algorithm, Bellman Ford Algorithm, Distance Vector Routing, Dynamic Routing. Routing protocols			
<b>Unit IV</b>	Transport layer services, Connection oriented & Connectionless, Three-way handshaking, UDP model, TCP:- TCP header format, comparison between UDP and TCP, Need of Congestion control, Principal of congestion, Quality of Service (QoS), Token bucket and leaky bucket algorithm			
<b>Unit V</b>	Application Layer: DNS, Electronic Mail, File Transfer (FTP), WWW, HTTP, SNMP, SMTP Introduction to Cryptography, Secret key algorithm, public key algorithm, Digital Signature Enterprise network security:DMZ,NAT			
<b>Text Books</b>				
1	Computer Networks: Andrew Tanenbaum, 4th Edition, PHI.			
2	Computer Communication Networks : Frouzan, 4th Edition, Tata Mc-Graw Hill			
3	William Stallings, “computer Networks and Cryptography”, 3rd edition, Pearson Education			
<b>Reference Books</b>				
1	Telecommunication Switching systems & Networks: Vishwanathan , 3 <sup>rd</sup> Edition,PHI.			
2	Computer Communication: W. Stanlling			
3	Communication Networks: Leon-Gracia			

## Useful Links

1	<a href="https://nptel.ac.in/courses/106/105/106105080/">https://nptel.ac.in/courses/106/105/106105080/</a>
2	<a href="https://nptel.ac.in/courses/117/105/117105076/">https://nptel.ac.in/courses/117/105/117105076/</a>
3	<a href="http://nptel.ac.in/courses/117103064">http://nptel.ac.in/courses/117103064</a>



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**Fourth Year (Semester-VII) B.Tech. Electronics & Communication Engineering**

**BEC4702: CMOS VLSI DESIGN**

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	CT-1	15 Marks
Tutorial	-	CT-2	15 Marks
Total Credit	3	TA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 03 Hrs 00 Min.	

**Course Outcomes (CO)**

Students will be able to

**Analyze** the PMOS and NMOS Transistor

**Illustrate** the CMOS Inverter

**Examine** the CMOS logic

**Infer** the characteristics of CMOS transistor.

**Design** layout for various circuits

**Course Contents**

<b>Unit I</b>	<b>MOS TRANSISTORS</b> nMOS enhancement and pMOS enhancement transistor, threshold voltage, body effect, MOS effect, MOS device equations, small signal model for MOS transistor.
<b>Unit II</b>	<b>CMOS INVERTER</b> Principle of operation, dc characteristics, transient characteristics, $\beta_n/\beta_p$ ratio, noise margin, static load MOS inverter, transmission gate, introduction to Bi-CMOS inverter.
<b>Unit III</b>	<b>STUDY OF CMOS LOGIC</b> Study of combinational logic, gates, compound gates, multiplexers, and memory elements using CMOS technology.
<b>Unit IV</b>	<b>CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION</b> Resistance and capacitance estimation, switching characteristics, power dissipation, charge sharing.
<b>Unit V</b>	<b>VLSI DESIGN</b> VLSI processing integration, layout design rules, and stick diagram representation latch up, CMOS circuits and logic design: transistor sizing, fan-in, fan-out and physical design of simple logic gates, CMOS logic structures and clocking strategies.

**Text Books**

T.1	Principal of CMOS VLSI design", Neil H. E. Weste, K. Eshraghian, Addison Wesley VLSI Series.
T.2	"Digital Interrogated circuits, A Design Perspective", J. M. Rabaey, A. Chandrakasan, and B. Nikolic., PHI Publications .
T.3	"CMOS VLSI Design" , Pucknell & K. Eshraghain, PHI Publications



<b>Reference Books</b>	
R.1	“VLSI Technology”, S.M. Sze, McGraw Hill Publications
R.2	“VLSI Design Technologies for Analog & Digital Circuits”, Randall L Gei , McGraw Hill Publications
R.3	Communication Networks: Leon-Gracia
<b>Useful Links</b>	
1	<a href="http://nptel.ac.in/courses/Webcoursecontents/IITBombay/VLSI%20Design/TOC.htm">http://nptel.ac.in/courses/Webcoursecontents/IITBombay/VLSI%20Design/TOC.htm</a>
2	<a href="http://nptel.ac.in/courses/117106092/1">http://nptel.ac.in/courses/117106092/1</a>



  
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<b>Fourth Year (Semester-VII) B.Tech. Electronics &amp; Communication Engineering</b>					
<b>BEC4703: Robotics and Automation</b>					
<b>Teaching Scheme</b>				<b>Examination Scheme</b>	
<b>Lectures</b>	3 Hrs/week			<b>CT-1</b>	15 Marks
<b>Tutorial</b>	-			<b>CT-2</b>	15 Marks
<b>Total Credit</b>	3			<b>CA</b>	10 Marks
				<b>ESE</b>	60 Marks
				<b>Total</b>	100 Marks
				Duration of ESE: 03 Hrs 00 Min.	
<b>Course Contents</b>					
<b>Unit I</b>	Introduction to Robotics: Types and components of a robot, Classification of robots, closed loop and open-loop control systems, Kinematics systems, Definition of mechanisms and manipulators, Social issues and safety.				
<b>Unit II</b>	Robot Kinematics and Dynamics: Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Jacobian, Singularity, and Statics Dynamic Modelling: Equations of motion: Euler-Lagrange formulation				
<b>Unit III</b>	Sensors and Vision System: Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc., Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean/Similarity/Affine/Projective transformations, Vision applications in robotics				
<b>Unit IV</b>	Robot Control: Basics of control: Transfer functions, Control laws: P, PD, PID Non-linear and advanced controls, Robot Actuation Systems: Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.				
<b>Unit V</b>	Control Hardware and Interfacing: Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications				
<b>Text Books</b>					
T.1	Saha, S.K., “Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.				
T.2	Mittal R.K. and Nagrath I.J., “Robotics and Control”, Tata McGraw Hill.				
T.3	Mukherjee S., “Robotics and Automation”, Khanna Publishing House, Delhi.				
<b>Reference Books</b>					
R.1	Craig, J.J., “Introduction to Robotics: Mechanics and Control”, Pearson, New Delhi, 2009				
R.2	Steve Heath, “Embedded System Design”, 2 nd Edition, Newnes, Burlington, 2003				
R.3	Ghosal, A., “Robotics”, Oxford, New Delhi, 2006				
<b>Useful Links</b>					
1	<a href="https://nptel.ac.in/courses/112/101/112101098/">https://nptel.ac.in/courses/112/101/112101098/</a>				
2	<a href="https://nptel.ac.in/courses/112/105/112105249/">https://nptel.ac.in/courses/112/105/112105249/</a>				

  
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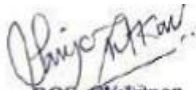
  
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<b>Fourth Year (Semester-VII) B.Tech. Electronics &amp; Communication Engineering</b>			
<b>BEC4704: Machine Learning</b>			
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Lectures</b>	3 Hrs/week	<b>CT-1</b>	15 Marks
<b>Tutorial</b>	-	<b>CT-2</b>	15 Marks
<b>Total Credit</b>	3	<b>TA</b>	10 Marks
		<b>ESE</b>	60 Marks
		<b>Total</b>	100 Marks
		<b>Duration of ESE: 03 Hrs 00 Min.</b>	
<b>Course Outcomes (CO)</b>			
Students will be able to			
Explain the concept of probability in Machine Learning.			
Explain fundamentals of Machine Learning.			
Apply the machine Learning Algorithm to classify data sets.			
Apply clustering techniques of Machine Learning to segment data and pattern.			
Analyze case study of Machine Learning Applications.			
<b>Course Contents</b>			
<b>Unit I</b>	<b>Introduction to Probability</b> :Probabilities of events, random variables, joint distribution & densities, moments of random variables, estimation of parameters from samples, minimum risk estimators.		
<b>Unit II</b>	<b>Overview of Machine learning concepts : Introduction</b> to Bayes Theorem, Linear Regression- model assumptions, regularization. Over fitting and train/test splits, Types of Machine learning - Supervised, Unsupervised, Reinforced learning.		
<b>Unit III</b>	<b>Classification and Regression Algorithms</b> :Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest and their classification Errors.		
<b>Unit IV</b>	<b>Clustering</b> :Sequential clustering, hierarchical clustering, probabilistic clustering, partitional clustering, clustering for region segmentation, Introduction to Neural Networks, back- propagation algorithm, Overview of Deep Learning.		
<b>Unit V</b>	<b>Case Studies of Machine Learning Application</b> :Weather forecasting, Stock market prediction, Object Detection and recognition, Real Time Applications.		
<b>Text Books</b>			
1	Aurélien Géron, "Hands-On Machine Learning with Scikit - Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media.		
2	Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.		
3	Learning by Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das.		
<b>Reference Books</b>			
1	Ian Good fellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press <a href="http://www.deeplearningbook.org">http://www.deeplearningbook.org</a> .		
2	Chopra Rajiv, "Machine Learning", Khanna Publishing House, Delhi.		
3	Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media.		
<b>Useful Links</b>			
1	<a href="https://nptel.ac.in/courses/106106139">https://nptel.ac.in/courses/106106139</a>		

2	<a href="https://www.youtube.com/watch?v=fC7V8QsPBec">https://www.youtube.com/watch?v=fC7V8QsPBec</a>
3	<a href="https://www.digimat.in/nptel/courses/video/106105152/L01.html">https://www.digimat.in/nptel/courses/video/106105152/L01.html</a>



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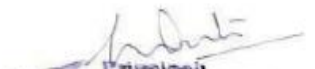
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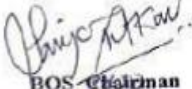


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<b>Fourth Year (Semester-VII) B.Tech. Electronics &amp; Communication Engineering</b>					
<b>BEC4705 : Satellite Communication</b>					
<b>Teaching Scheme</b>			<b>Examination Scheme</b>		
<b>Lectures</b>	3 Hrs/week		<b>CT-1</b>	15 Marks	
<b>Tutorial</b>	-		<b>CT-2</b>	15 Marks	
<b>Total Credit</b>	3		<b>CA</b>	10 Marks	
			<b>ESE</b>	60 Marks	
			<b>Total</b>	100 Marks	
			Duration of ESE: 03 Hrs 00 Min.		
<b>Course Contents</b>					
<b>Unit I</b>	<b>INTRODUCTION AND ORBITAL ASPECTS OF SATELLITE COMMUNICATIONS</b> : A brief history of satellite communications, Orbital mechanics, Keplers laws of planetary motion, Locating the satellite in the orbit, Locating the Satellite with respect to the earth, Orbital elements, Look angle determination, Orbital perturbations, launches and launch vehicles, Orbital effects in communication System performance.				
<b>Unit II</b>	<b>SATELLITE SUB SYSTEMS:</b> Introduction, attitude and orbit control system, Telemetry, tracking, command and monitoring, Power Systems, Communication Subsystems, Satellite antennas.				
<b>Unit III</b>	<b>SATELLITE LINK DESIGN:</b> Introduction, Basic transmission theory, System noise temperature and G / T ratio. Design of uplink and down link models, Design of satellite links for specified C / N ratio. <b>EARTH STATIONS:</b> Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power, test methods.				
<b>Unit IV</b>	<b>LOW EARTH ORBIT AND NON-GEO STATIONARY SATELLITE SYSTEMS</b> : Introduction, Orbit consideration, coverage and frequency considerations, Delay and Throughput considerations, System considerations, Operational NGSO constellation Designs				
<b>Unit V</b>	<b>SATELLITE NAVIGATION &amp; THE GLOBAL POSITIONING SYSTEM</b> : Introduction, Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS				
<b>Text Books</b>					
T.1	T Pratt and W Bostiain - Satellite Communications, 2nd Edition, John Wiley, 2003.				
T.2	Wilbur L. Pritchard, Henri G.Suyderhoud and Robert A Nelson - Satellite Communication Systems Engineering, 2nd Edition, Pearson Publications, 2003.				
T.3	Satellite Communications SystemsSystems, Techniques and Technology By Gerard Maral, Michel Bousquet, Zhili Sun · 2020				
<b>Reference Books</b>					
R.1	Dennis Roddy, Satellite communications, McGraw Hill, 4 th Edition,2009.				
R.2	DC Agarwal, Satellite Communications, Khanna Publishers, 2003 Robert M Gagliard, Satellite				

	Communications
R.3	Satellite Communications Systems Systems, Techniques and Technology By Gerard Maral, Michel Bousquet, Zhili Sun · 2020
<b>Useful Links</b>	
1	<a href="http://nptel.iitm.ac.in/courses/">http://nptel.iitm.ac.in/courses/</a>
2	<a href="https://archive.nptel.ac.in/courses/117/105/117105131/">https://archive.nptel.ac.in/courses/117/105/117105131/</a>
3	<a href="https://encryptedtbn2.gstatic.com/faviconV2?url=https://www.digimat.in&amp;client=ABOUT_THIS_RE SULT&amp;size=32&amp;type=FAVICON&amp;fallback_opts=TYPE,SIZE,URL">https://encryptedtbn2.gstatic.com/faviconV2?url=https://www.digimat.in&amp;client=ABOUT_THIS_RE SULT&amp;size=32&amp;type=FAVICON&amp;fallback_opts=TYPE,SIZE,URL</a>

  
**BOS Chairman**  
 Department of Electronics & Comm  
 Tulsiramji Galkwad - Patil College  
 of Engineering & Technology, Nagpur

  
**Dean Academics**  
 Tulsiramji Galkwad-Patil  
 College Of Engineering  
 and Technology, Nagpur

  
**Vice-Principal**  
 Tulsiramji Galkwad-Patil  
 College Of Engineering &  
 Technology, Nagpur

  
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 Technology, Nagpur



**Tulsiramji Gaikwad-Patil College of Engineering and Technology**

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**Fourth Year (Semester-VII) B.Tech. Electronics & Communication Engineering**

**BEC4706: Computer Communication Network Lab**

Teaching Scheme		Examination Scheme	
Practical	2Hrs/week	CA	25 Marks
Total Credit	1	ESE	25 Marks
		Total	50 Marks
		Duration of ESE:02Hrs00Min.	

**Course Outcomes (CO)**

Students will be able to

- 1 **Examine** the fundamentals of Computer Network devices & Network.
- 2 **Analyze** data link layer & HDLC in packet tracer.
- 3 **Determine** the routing algorithm in the Computer Network.
- 4 **Examine** the structure of transmission Control Protocol (TCP) & User Datagram Protocol (UDP).
- 5 **Demonstrate** FTP server and DNS server on Packet Tracer.

Sr.No.	List of Experiment	CO
1	Examine the operation of Network Devices.	CO1
2	Implement computers within a Local Area Network (LAN).	CO1
3	Analyze data link layer traffic simulation using packet tracer.	CO2
4	Demonstrate High Level Data Link Control on packet tracer	CO2
5	Implement IP static routing on packet tracer.	CO3
6	Execute OSPF Routing Protocol using Cisco Packet Tracer(Link State Routing).	CO3
7	Implement TCP/UDP Protocol on Packet Tracer.	CO4
8	Execute TCP/IP protocol in windows/LINUX.	CO4
9	Execute FTP Server Using CISCO Packet Tracer.	CO5
10	Implement DNS server in cisco packet tracer.	CO5

**Text Books**

1	Computer Networks: Andrew Tanenbaum, 4th Edition, PHI.
2	Computer Communication Networks : Frouzan, 4th Edition, Tata Mc-Graw Hill
3	

**Reference Books**

1	Telecommunication Switching systems & Networks: Vishwanathan , 3 <sup>rd</sup> Edition, PHI.
2	Computer Communication: W. Stanling

**Useful Links**

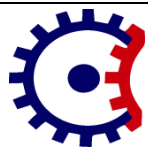
1	<a href="https://archive.nptel.ac.in/courses/106/105/106105183/">https://archive.nptel.ac.in/courses/106/105/106105183/</a>
2	<a href="https://onlinecourses.nptel.ac.in/noc22_ee61/preview">https://onlinecourses.nptel.ac.in/noc22_ee61/preview</a>

  
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## **Fourth Year (Semester-VII) B.Tech. Electronics & Communication Engineering**

### **BEC4707: CMOS VLSI DESIGN LAB**

Teaching Scheme		Examination Scheme	
Practical	2Hrs/week	CA	25 Marks
Total Credit	1	ESE	25 Marks
		Total	50 Marks
		Duration of ESE: 02 Hrs 00 Min.	

### **Course Outcomes(CO)**

Students will be able to

1	<b>Describe</b> and interpret the basic concepts of MOS transistors
2	<b>Construct</b> the ability to design a system, component or process as per needs and specifications.
3	<b>Analyze</b> inverter design, characteristics and applications and performance parameters of CMOS Circuits.
4	<b>Evaluate</b> circuits using CMOS styles.
5	<b>Analyze</b> performance of the complex logic structures

Sr.No.	List of Experiment	CO
1	Demonstrate to VLSI Design	CO1
2	Demonstrate Microwind Tool	CO1
3	Design of CMOS inverter	CO2
4	Design of NOR Gate	CO2
5	Design of NAND Gate	CO3
6	Design of AND Gate & OR Gate	CO3
7	Design of Exclusive Gates	CO4
8	Design of Half Adder	CO4
9	Design of Full Adder	CO5
10	Design of D Flip flop	CO5

### **Text Books**

T.1	Principal of CMOS VLSI design", Neil H. E. Weste, K. Eshraghian, Addison Wesley VLSI Series.
T.2	"Digital Interrogated circuits, A Design Perspective", J. M. Rabaey, A. Chandrakasan, and B. Nikolic., PHI Publications .
T.3	"CMOS VLSI Design" , Pucknell & K. Eshraghain, PHI Publications

### **Reference Books**

R.1	"VLSI Technology", S.M. Sze, McGraw Hill Publications
R.2	"VLSI Design Technologies for Analog & Digital Circuits", Randall L Gei , McGraw Hill Publications

### **Useful Links**

1	<a href="http://nptel.ac.in/courses/Webcoursecontents/IITBombay/VLSI%20Design/TOC.htm">http://nptel.ac.in/courses/Webcoursecontents/IITBombay/VLSI%20Design/TOC.htm</a>
2	<a href="http://nptel.ac.in/courses/117106092/1">http://nptel.ac.in/courses/117106092/1</a>



