Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
ECCDLO 8023	Network Management in Telecommunication	03	--	--	03	--	--	03

Course Code	Course Name	Examination Scheme							
		Theory Marks				Exam Duration (Hrs.)	Term Work	Practical and Oral	Total
		Internal Assessment			End Sem. Exam.				
		Test1	Test2	Avg.					
ECCDLO 8023	Network Management in Telecommunication	20	20	20	80	03	--	--	100

Course pre-requisite:

ECC602- Computer Communication Networks

Course Objectives:

1. To understand the concepts of network management in Telecommunication (NMT), architectures and protocols.
2. To familiarize the student with the design, analysis, operation and management of modern data communications networks.
3. To provide the student with a working knowledge of the types of communication network management systems and their strengths and limitations in solving various information network management problems.

Course Outcome:

After successful completion of the course, the student will be able to:-

1. Explain the need for interoperable network management and analyze the trends and development of the Telecommunications Network Management.
2. Demonstrate broad knowledge of fundamental principles and technical standards underlying NMT.
3. Describe the concepts and architecture behind standards-based network management associated with SNMP and CMIP.
4. Apply basics of telecommunication, networking and information technologies and architect and implement networked informative systems.
5. Continuously improve their knowledge of technology and communication skills.

Module No.	Unit No.	Topics	Hrs.
1.0		**Introduction of Network Management**	**6**
	1.1	Introducing Network Design Concepts: Case histories on network, system and service management, Network design based on economy and SLA-based services. Challenges of IT managers	
	1.2	Network Management: Goals, organization and functions	
	1.3	Network management architecture, organization network and management perspectives	
2.0		**OSI Network Management**	**6**
	2.1	Network Management standards	
	2.2	OSI Network Management model	
	2.3	Network Management layers	
	2.4	ISO Network Management functions	
	2.5	Communication model and functional model	
	2.6	Abstract Syntax Notation One (ASN.1): Terminology, symbols, and conventions. TLV encoding structure	
3.0		**Internet Management**	**10**
	3.1	**SNMP model**: SNMP Organizational model, System overview, Information model, Management of Information Base	
	3.2	**SNMP v1**: SNMP Communication model- SNMP architecture, Administrative model, SNMP Protocol specifications, SNMP operations, SNMP Functional model	
	3.3	**SNMPv2**: Major changes in SNMPv2, SNMPv2 architecture, SNMPv2 Management Information Base, SNMPv2 protocol, Compatibility with SNMPv1	
	3.4	**SNMPv3**:Key features, SNMPv3 architecture, SNMPv3 applications, Security, security model, message format, SNMPv3 User- based Security Model, Access control (VACM)	
	3.5	**RMON:** What is RMON? RMON 1, RMON 2	
4.0		**Telecommunication Management Networks(TMN)**	**4**
	4.1	Definition of TMN , TMN framework, TMN functional model	
	4.2	TMN Conceptual model, OSI functionality in TMN	
	4.3	TMN management services architecture and TMN implementation	
5.0		**Network Management Tools and Applications**	**9**
	5.1	System Utilities for Network Management: Basic tools, SNMP tools and Protocol analyzer	
	5.2	Network Statistics and Measurements: Traffic load, Protocol statistics, Data and Error statistics	
	5.3	NMS Design: Functional requirements, NMS Client design and NMS Server architecture, Distributed Management approaches	
	5.4	Network Management Systems: Commercial and Open-source NMSs	
	5.5	Network Management Applications: Fault, Configuration, Accounting, Performance and Security (FCAPS)	
	5.6	Event Correlation Techniques: Rule-based reasoning, Model-based reasoning, Case-based reasoning, Codebook, State Transition Graph model and Finite State Machine model	

	5.7	Report Management, Policy-based Management and Service Level Management	
6.0		**Broadband Network Management**	4
	6.1	Broadband networks and services, ATM Technology – VP, VC, ATM Packet, Integrated service, ATM LAN emulation, Virtual LAN	
	6.2	ATM Network Management – ATM network reference model, Integrated Local Management Interface, role of SNMP and ILMI in ATM	
	6.3	ATM Management Information Base, M1, M2, M3, M4 interfaces	
		Total	39

Text books

1. Mani Subramaniam, *Network Management Principles and Practice*, New Delhi: Pearson, 2010.
2. Alexander Clemm, *Network Management Fundamentals*, Cisco Press, December 2006, ISBN-13: 978-158720137.
3. Benoit Claise and Ralf Wolter, *Network Management: Accounting and Performance Strategies*, CISCO Press, 2007.
4. J. Richard Burke, *Network Management: Concepts and Practice, A Hands-On Approach*,Pearson Education India, 2008, ISBN-13: 978-8131718490.
5. Salh Aiidarons, Thomas Plevoyak, *Telecommunications Network Technologies and Implementations*, Eastern Economy Edition, New Delhi:IEEE Press, 1998.
6. Henry Haojin Wang, *Telecommunication Network Management*, McGraw Hill, 1999.

Online Learning Resources:-

1. https://www.youtube.com/watch?v=liBB_Q7Go5k
2. https://www.youtube.com/watch?v=xdUjwlyyi9U
3. https://www.youtube.com/watch?v=aQGeSDauRso
4. https://nptel.ac.in/courses/117/101/117101050/
5. https://nptel.ac.in/courses/106/105/106105183/

Internal Assessment (20-Marks):

Internal Assessment (IA) consists of two class tests of 20 marks each. IA-1 is to be conducted on approximately 40% of the syllabus and IA-2 will be based on remaining contents (approximately 40% syllabus but excluding contents covered in IA-I). Duration of each test shall be one hour. Average of the two tests will be considered as IA marks.

End Semester Examination (80-Marks):

Weightage to each of the modules in end-semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of **total 06** questions, each carrying **20 marks**.
2. **Question No: 01** will be **compulsory** and based on entire syllabus wherein 4 to 5 sub-questions will be asked.
3. Remaining questions will be mixed in nature and randomly selected from all the modules.
4. **Total 04 questions** need to be attempted.