

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Network Information Theory
2.	Course Number	EE6022
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Electrical Engineering
8.	To take effect from	July 2019
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	Course Objective: The present course aims to explore optimal performance limits and efficient information processing strategies to achieve fundamental capabilities and limitations of communication networks.	
12.	Course Content: Multiple access channel (MAC): Achievable result for MAC using successive decoding; Outer bound on the capacity region of MAC; Gaussian MAC and its capacity analysis; Broadcast channel (BC): Superposition coding scheme and its optimality for the degraded broadcast channel; Relation between the capacity region of Gaussian BC and MAC; Interference channel (IC) : Information theoretic limits of conventional techniques such as time-sharing and treating interference as noise; Han-Kobayashi scheme and its performance analysis; Advanced interference mitigation techniques such as interference alignment; Relay channels: Information theoretic limits of different relay forwarding schemes such as Amplify and Forward and Decode and Forward.	
13.	Text book(s): 1. A. El Gamal and Y. H. Kim, <i>Network Information Theory</i> , Cambridge University Press, (2011). 2. T. Cover and J. A. Thomas, <i>Elements of Information Theory</i> , Wiley Student Edition, (2006).	
14.	Reference(s): 1. G. Kramer, <i>Topics in Multiuser Information Theory: Foundations and Trends in Communications and Information Theory</i> , NOW Publisher, (2008). 2. R. W. Yeung, <i>Information Theory and Network Coding</i> , Springer, (2008). 3. D. Tse and P. Viswanath, <i>Fundamentals of Wireless Communication</i> , Cambridge University Press, (2005).	