

Sant Gadge Baba Amravati University, Amravati

Part A

Faculty: Science and Technology

Programme: Bachelor of Computer Application (BCA)

Part B

Syllabus Prescribed for 3 Year BCA UG Programme

Programme: Bachelor of Computer Application (BCA)

Semester V

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Hours/Period)
5BCAOE1	Blockchain Technology	60 Periods

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1. Understand how blockchain systems work,
2. To securely interact with blockchain system.
3. Design, build, and deploy smart contracts and distributed applications,
4. Integrate ideas from blockchain technology into own projects.

Unit	Content
Unit I	Blockchain Basics: Distributed Database, Two General Problem, Byzantine general problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof (12 Periods)
Unit II	Introduction to Blockchain: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain. (11 Periods)
Unit III	Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate. (11 Periods)
Unit IV	Crypto Currency: History, Distributed Ledger, Bitcoin protocols, Mining strategy and rewards, Ethereum, Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin (11 Periods)
Unit V	Crypto Currency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects, Crypto Currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service, Future of Blockchain (11 Periods)
*SEM Assignment, Class test, Attendance, Seminar, Study tour, Industrial visit, Field work, Group discussion or any other innovative practice/activity	
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<ol style="list-style-type: none"> 1. Explain the Simplified Payment Verification protocol. 2. List and describe differences between proof-of-work and proof-of-stake consensus. 3. Interact with a blockchain system by sending and reading transactions. 4. Design, build, and deploy a distributed application. 5. Evaluate security, privacy, and efficiency of a given blockchain system. 	
**Activities	1. Naive Blockchain construction 2. Mining puzzles (4 Periods)

Course Material/Learning Resources

Text books:

1. Blockchain Technology by Dr. Ms. Manisha Bharambe , Ms. Manisha Gadekar
2. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Princeton University Press

Reference Books:

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies by Antonopoulos,
2. Bitcoin: A Peer-to-Peer Electronic Cash System by Satoshi Nakamoto,
3. "ETHEREUM: A Secure Decentralized Transaction Ledger," by DR. Gavin Wood, Yellow paper.2014.
4. A survey of attacks on Ethereum smart contracts by Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli,

Weblinks to Equivalent MOOC on SWAYAM if relevant:

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview
2. https://onlinecourses.nptel.ac.in/noc20_cs01/preview
3. https://onlinecourses.swayam2.ac.in/aic21_ge01/preview

Weblinks to Equivalent Virtual Lab if relevant:

1. <http://vlabs.iitb.ac.in/vlabs-dev/labs/blockchain/labs/index.php>
2. <https://blockchainlab.com/>

Any pertinent media (recorded lectures, YouTube, etc.) if relevant:

1. <https://www.youtube.com/watch?v=RaOKTgGyyyo>
 2. <https://www.youtube.com/watch?v=YJyXfjbBmc8>
 3. <https://www.youtube.com/watch?v=VU59tR982W4&list=PLgPmWS2dQHW-BROCQCNYgmHUfCN115pn0>
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