





# **CERTIFICATION PROGRAMME**

## On

# **Blockchain and its Applications**

From

13<sup>th</sup> September - 20<sup>th</sup> December 2022 Convener: Mr. Abhay N Tripathi, Associate Professor, MIMT

For BCA V<sup>th</sup> Semester

**Resource Person** 

Dr. Himanshu Rastogi Associate Professor, MIMT

www.mangalmay.net.in | Plot No. 8 & 9, Knowledge Park-II, Greater Noida, Delhi-NCR, India





### Syllabus

#### **Blockchain and its Applications**

#### **Duration: 36 hours**

Module 1: Introduction to Blockchain-What is Blockchain, Traditional way to sharing /files. Centralized and Decentralized Network, Problems with the centralized network, Public Ledger, Merkley Hash Tree, Bitcoin, Bitcoin Transaction Life Cycle, Smart Contract, Blockchain Architecture, Transaction in a block.

Basic Crypto Primitives- Cryptography, Public and Private Key, SHA Algorithm, Digital Signature

Bit coin Basics- Crypto currency, Double spending

Module 2: Distribute Consensus-Why consensus, Proof of Work, Proof of Stake, Proof of Burn.

Types of Block chain -Permissioned, Permission less, and Hybrid, Byzantine General Problem in PermissionBlock chain

**Module 3:** Blockchain Components and Concepts, Hyperledger – Introduction, Distributed Ledger Technology, Interaction of application with Ledger

Blockchain Applications- SCM, Government (Tax payment & Land Registry Record), Health, Education

#### **Reference Books:**

- 1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos
- 2. Blockchain by Melanie Swa, O'Reilly
- 3. Hyperledger Fabric https://www.hyperledger.org/projects/fabric
- 4. Zero to Blockchain An IBM Redbooks course, by Bob Dill, David Smits https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html





#### Schedule

Duration: 36 hours								
Session	Content	Time	Date					
1.	Introduction to Blockchain-Traditional way to sharing filesand What is Blockchain	03:00-4:30	13/09/2022					
2.	Centralized and Decentralized Network and Advantages and Problems with the centralized network	03:00-4:30	19/09/2022					
3.	Public or Private Ledger, Merkley Hash Tree	03:00-4:30	20/09/2022					
4.	Hashing Technique, Demonstration of Hashing Technique (online)	12:00-1:30	22/09/2022					
5.	Bitcoin, Bitcoin Transaction Life Cycle	03:00-4:30	27/09/2022					
6.	Smart Contract and its uses	03:00-4:30	10/10/2022					
7.	Blockchain Architecture, Transaction in a Blockchain	03:00-4:30	11/10/2022					
8.	Basic Crypto Primitives- Cryptography, Encryption and Decryption	03:00-4:30	17/10/2022					
9.	Public and Private Key, SHA Algorithm	03:00-4:30	18/10/2022					
10.	Digital Signature and its importance	03:00-4:30	31/10/2022					
11.	Bitcoin Basics- Cryptocurrency	03:00-4:30	01/11/2022					
12.	Forking in Blockchain	03:00-4:30	07/11/2022					
13.	What is Double spending and how Blockchain is helpful to check Double Spending?	03:00-4:30	08/11/2022					
14.	Revision of Module 1	03:00-4:30	14/11/2022					
15.	Distributed Consensus-Why consensus	03:00-4:30	21/11/2022					
16.	Proof of Work, Proof of Stake, Proof of Burn	03:00-4:30	22/11/2022					
17.	Types of Blockchain- Permissioned, Permissionless,	03:00-4:30	28/11/2022					





	and Hybrid		
18.	Byzantine General Problem in Permissioned Blockchain	03:00-4:30	29/11/2022
19.	Revision of Module 2	03:00-4:30	05/12/2022
20.	Blockchain Components and Concepts	03:00-4:30	06/12/2022
21.	Hyperledger – Introduction, Distributed Ledger Technology,Interaction of application with Ledger	03:00-4:30	12/12/2022
22.	Blockchain Applications- SCM	03:00-4:30	13/12/2022
23.	Government (Tax payment & Land Registry Record), Health, Education	03:00-4:30	19/12/2022
24.	Revision of Module 3	03:00-4:30	20/12/2022





	REPORT						
Name of Activity	Blockchain and its Applications						
Date	13 <sup>th</sup> September 2022 to 20 <sup>th</sup> December 2022						
Venue	Class Room						
Organized by	Computer Applications Department						
<b>Resource Person</b>	Dr. HimanshuRastogi, Associate Professor, MIMT						
Beneficiaries	BCA Students (35 Students)						
Convener	Mr. Abhay N Tripathi, Associate Professor, MIMT						
Objective	<ul> <li>Student will understand Blockchain Technology from the basics platform and will learn how to use block-chain digital databases to be distributed and how it is capable of working like a distributed network.</li> <li>Studentwill know what the Distributed Ledgers are in Blockchain and they will know how various transactions are updated by the Distributed Ledgers and updated from time to time.</li> <li>Studentwill learn how Blockchain technology is connected to our society and how you all are going to be dependent on blockchain technology in the coming days.</li> </ul>						
Content	<ul> <li>With the initiative of IQAC, Mangalmay Institute of Management and Technology organized Add on Certification Course on "Blockchain and its Application".</li> <li>Day1: The session started with the discussion about the traditional way to sharing files remotely and their disadvantages. Introduction to Blockchain technology was also discussed.</li> <li>Day 2: In this session, the concept of Centralized and Decentralized Networkwith their advantages was discussed and problems with the centralized network are also pointed out.</li> <li>Day 3: In this session, the student came to know about the public and private ledger with their advantages and disadvantages. To maintain the linkage between nodes in a blockchain network, Merkley Hash Tree was discussed.</li> <li>Day 4: This session was focused on Hashing Technique trough online demonstration.</li> <li>Day 5: In this session, the resource persons discussed about the Bitcoin, Bitcoin Transaction Life Cycle.</li> <li>Day 6: Concept of contract and Smart Contract with its uses was discussed.</li> <li>Day 7: The session was based on the Blockchain Architecture and</li> </ul>						





	Transaction in a Blockchain.
	Day 8: The resource persons discussed with students about the basics of
	Crypto Primitives-Cryptography, Encryption and Decryption.
	Day 9: In this session, Public and Private keysand SHA algorithm was
	introduced.
	Day 10: Resource person discussed the digital signature and its importance.
	Day11: Bitcoin Basics-Cryptography was taught in the classroom.
	Day 12: In this session, Students learnt Forking in Blockchain.
	Day 13: In this session, the resource person discussed about the basics of
	double spending and Blockchain is helpful to check Double Spending.
	Day 14: Revision of module 1.
	Day 15: In this session, Distributed Consensus was taught.
	Day 16: The session was based on the Proof of Work, Proof of Stake, and
	Proof of Burn.
	Day 17: This session was based on the types of Blockchain-Permissioned,
	Permissionless and Hybrid
	Day 18: Byzantine General Problem in Permissioned Blockchain was taught.
	Day 19: Revision of module 2.
	Day 20: This session was about the Blockchain Components and Concepts.
	Day 21: Introduction to Hyperledger, Distributed Ledger Technology and
	Interaction of application with ledger was discussed.
	Day 22: The discussion was done on the implementation of Blockchain in
	the field of SCM.
	Day 23:Implementation in Government (Tax payment and Land Registry
	Record), Health, Education was also discussed
	Day 24: Revision of module 3.
	Student will be able to understand :
	• The basic concepts of Computer Network, Computer Network
Outcome of Activity	Security, and Data Structure.
Outcome of Activity	• Also students will be able to understand the concept of Blockchain
	and he will be able to understand the importance of the Blockchain in
	various domain



#### **Resource Person Profile**

Name : Dr. HimanshuRastogi, Associate Professor

Core Skills: C, C++, Advance Excel, Web Development

Qualification: MCA, M.Tech (CS), PhD

Experience: 23.5 years

Research Area: Digital Watermarking, Blockchain Technology



Figure 1 Dr. HimanshuRastogi during his session



#### **Certificate Template:**



Course: BCA	Course Name	ADD- e: Blockcha	ON COURSI	E QUIZ es & its Application	Time: 3 Date: 2	0 Min 26   12   20 2 2
Roll No:	Name:	Jenan	Rayfid		Year/Se	m: III/V
		9		Invigilator	r's Sign:	SVE
Note: All questio	ns are compulso	ry. Each qu	estion will car	ry '1' mark and there is	no 'Negativ	ve Marking'
1) What is a A block	blockchain? ockchain is a ce or consisting of as.	entralized of records ca	ligital lled b.)	A blockchain is a dec digital ledger consist blocks.	centralized ting of reco	, distributed. ords called
c.) A blc consi	ockchain is a di sting of record	gital datab s called cla	ase d.)	None of the above		
2) P2P stand	for			h ¥una j		
a.) Priva	te to Public		b.)	Password to Private		
c.) Peer	to Peer (	)	d.)	None of the above		
3) The term u	used for a block	cchain spli	ts is	-• .	•	
· a.) A me	erger	0	b.)	A fork		
A de	rision	0	d.)	None of the above		•
4) It is possib	le to program	a blockcha	in to record t	ransactions automatica	ally. True/	False.
a.) True	•	$(\mathbf{i})$	b.)	False		
5)	is used for	storing bito	coins			
a.) Block	c	( <b>1</b>	) UST	Wallet		
c.) Both	A and B	(	) d.)	None of the above		
6)is	the type of lea	dger preser	nt in Blockch	ain.		
a.) Distr	ibuted Ledger	$\bigcap$	b.)	Decentralized Ledge	r	
c, Both	A and B	U	d.)	None of the above		
7) In blockch	ain, a block is	consist of	<u></u> ;}			
a.) A Tir	nestamp		b.)	Transaction data		•
c.) A Ha	sh point	$\bigcirc$	d	All of the above		
8) Smart cont	racts are not th	e legal doo	cuments?		· · ·	
a) Yes		Ê	b.)	No		
c.) May ł	be		() d.)	Can't say		
		<u> </u>				

- 9) What is a miner?
  - a.) A type of blockchain
  - c.) A person doing calculations to verify a transaction
- 10) What is the purpose of a nonce?
  - a.) Follows nouns
  - c.) Prevents double spending
- 11) What is a genesis block?
  - a.) The first block of a Blockchain
  - c.) The first block after each block halving
- 12) True or False: Blockchain is the same as Bitcoin.
  - a.) True
- 13) What is a Private Key?
  - a.) A key on your keychain
  - C.J A key not given to the public
- 14) Who invented Merkle Tree?
  - a) Ralph Merkle
    - c.) Nick Szabo
- 15) Who created Bitcoin?
  - a Satoshi Nakamoto
  - c.) John McAfee

False

chain

transactions

A hash function

d.)

d.)

b.)

d.)

- b.) A key given to the public
- d.) A key that opens the secret door

12

An algorithm that predicts the next part of the

Computers that validate and process blockchain

Sends information to the blockchain network

A famous block that hardcoded a hash of the

Book of Genesis onto the blockchain

The 2nd transaction of a Blockchain

- b.) Rolph Wiggun
- d.) Vitalic Buterin
- b.) Samsung
- d.) China

----- For Departmental use only ------

Max. Marks: 15

Marks Obtained:

Name of Evaluator:

Sign.

K. Kimanshu Rastof

-NA

Cours	e: BCA	ourse Nam	ADD. e: Blockcha	-ON COURS	SE QUIZ ties & its Application	Time: 3 Date: 2	0 Min 26(12) 20 2 2
Roll N	0.	Name:	Andresta	Dutta		Year/Se	em: III/V
Kon N	0.		Angene	Duud	Invigilator	r's Sign:	10/2
Note: /	All questions a	re compulso	ory. Each q	uestion will c	arry '1' mark and there is	no 'Negati	ve Marking
1)	What is a bloc A blockc Iedger co blocks A blockc	kchain? hain is a c nsisting of hain is a d	entralized f footers c igital data	digital alled b.) base d.)	A blockchain is a dec digital ledger consist blocks. None of the above	centralized ing of rec	l, distributed, ords called
	consistin	g of record	is called c	1888.			
2) I	P2P stand for						
8	a.) Private to	o Public		b.)	Password to Private		
C	Peer to P	cor	1	d.)	None of the above		
3)	The term used	for a bloc	kchain spl	its is	/		
2	) A merge	r		by	A føtk		
	a) A divisio	on		d.)	Noire of the above		
	t is possible t	nrogram	ablockch	ain to record	transactions automatic	allv. True	False.
4) 1			a biocken				
2	True			b.)	False		
5)	i	s used for	storing bi	tcoins			
a	.) Block			(بطر	Wallet		
c	.) Both A a	nd B		d.)	None of the above		
6)	is the	e type of le	edger prese	ent in Blockc	hain.		
а	.) Distribut	ed Leager	$\square$	b.)	Decentralized Ledge	r	
ç	Both A a	nd B	5	d.)	None of the above		
7) I	n blockchain,	a block is	consist of				
а	.) A Times	tamp	6	b.)	Transaction data		
c	A Hash r	ooint	C	) d.)	All of the above		
-	-						
8) S	Smart contract	s are not t	he legal de	pcuments?			
7	.) Yes		( )	) b.)	No		
с	.) May be		$\smile$	d.)	Can't say		

#### 9) What is a miner?

An algorithm that predicts the next part of the a.) A type of blockchain b.) chain Computers that validate and process blockchain N A person doing calculations to c.) d.) verify a transaction ransactions What is the purpose of a nonce? 10)'a.) b.) A hash function Follows nouns c.) d.) Sends information to the blockchain network Prevents double spending 11) What is a genesis block? A famous block that hardcoded a hash of the b.) a.) The first block of a Blockchain Book of Genesis onto the blockchain The first block after each block c.) d.) The 2nd transaction of a Blockchain halving True or False: Blockchain is the same as Bitcoin. 12) b.) a True False 13) What is a Private K b.) a.) A key on your keychain A key given to the public A key not given to the public d.) c.) A key that opens the secret door 14) Who invented Merkle Tree? b.) a.) Ralph Merkle Rolph Wiggun d.) c.) Vitalic Buterin Nick Szabo 15) Who created Bitcoin? b.) a.) Satoshi Nakamoto Samsung d.) c.) China John McAfee - For Departmental use only

Max. Marks: 15

Marks Obtained:

Name of Evaluator:

Sign. R. Himansher Rastofi

ourse: BCA			countr		Times 20 Min
	Course Na	ADD-ON me: Blockchain Te	coursi	S QUIZ es & its Application	Date: 26/12/2022
oll No:	Name:	Devendera	Kuma	vr	Year/Sem: III/V
				Invigilator	's Sign:
ote: All questi	ons are compul	sory. Each questio	n will car	ry '1' mark and there is	no 'Negative Marking'
What is a	blockchain?				
A b a.) ledg	lockchain is a ger consisting	centralized digita of records called	al by	A blockchain is a dec digital leager consist blocks	centralized, distributed, ing of records called
c.) A b	lockchain is a sisting of reco	digital database rds called class.	d.)	None of the above	
) P2P stan	d for	·			
a.) Priv	ate to Public		b.)	Password to Private	
c) Pee	r to Peer	<u> </u>	d.)	None of the above	
) The term	used for a blo	ockchain splits is	if i		-
a.) A r	nerger	$\sim$	b.)	A fork	· · ·
C. Ad	ivision J		d.)	None of the above	
) It is poss	ible to program	m a blockchain to	record t	ransactions automatic	ally. True/False.
a.) Tru	e	20	by	False	
)	is used fo	or storing bitcoin	5		
,	lo used it		h)	Wallet	
c Bot	h A and B	O	d.)	None of the above	
	is the type of	ledger present in	Blocket	ain	
•	tributed Lede			Decentralized Lades	
(a.) Dis	h A and P		d)	None of the shows	er
			u.)	None of the above	
) In block	chain, a block	is consist of			
a.) A 7	imestamp		b.)	Transaction data	
c.) A H	Iash point		d)	All of the above	
Smart co	ntracts are not	t the legal docum	ents?		
			ients:		
			b.)	No	

9) What is a miner?



------ For Departmental use only ------Max. Marks: 15 Marks Obtained: @

Name of Evaluator:

Sign.

Dr. Wmanshu Rastoj

Course: BCA ADD-ON CO Course Name: Blockchain Tech		DURSI	E QUIZ es & its Application	Time: Date: ;	30 Min 261121 2022				
Roll	No:	Name:	Mohit	Sinal	•		Year/S	em: [[]/V	
				1.30		Invigilato	r's Sign:	¥Xy/	
Note	: All que	stions are compul	sory. Each	mestion v	vill car	ry '1' mark and there is	no 'Negat	ve Marking'	
11010	i i iii que		sory. Each	question	31	.,		Ū	
1)	What is	s a blockchain?		1			oontrolivo	d distributed	
	a.) le bl	dger consisting locks.	of records	called	1by	digital ledger consist blocks	ting of rec	ords called	
	c.) A	blockchain is a onsisting of reco	digital dat rds called	abase class.	d.)	None of the above			
2)	P2P sta	and for	·						
	a.) P	rivate to Public			b.)	Password to Private		$\gamma_{I}$	
	c.) 🗸 P	cer to Reer			d.)	None of the above			
3)	The ter	rm used for a blo	ockchain sp	olits is					
	a.) A	merger			b.V	A fork		ι. L	
	c.) A	division			d.)	None of the above	•		
4)	It is po	ssible to program	n a blockc	hain to re	ecord t	ransactions automatic	ally. True	False.	
	a. <b>)</b> / T	rue 🕖			b.)	False			
5)		is used fo	or storing b	itcoins				S	
	a.) B	Block			by	Wallet			
	c.) B	Both A and B			d.)	None of the above			
6)		is the type of	ledger pres	sent in B	lockch	ain.			
	a.) D	Distributed Ledge	er		b.)	Decentralized Ledge	er		
	ar B	Both A and B			d.)	None of the above			
7)	In bloc	kchain, a block	is consist c	of					
	a.) A	Timestamp			b.)	Transaction data	he have a state	4 28 .	
	c.) A	Hash point			d)	All of the above	·		
						<u> </u>			
8)	Smart	contracts are not	the legal of	locumen	ts?				
	NY Y	es	2		b.)	No			
	c.) M	lay be	U		d.)	Can't say			

9) What is a miner?



Max. Marks: 15 Name of Evaluator: Buffmanshu Rastrji

Scanned with CamScanner

Cou	rse: BCA	Course Nam	ADD-ON e: Blockchain Te	COURSI	EQUIZ es & its Application	Time: 30 Min Date: 2.6112 120 2.2
Roll	No:	Name:	Perena.	Venna	2	Year/Sem: III/V
					Invigilator	r's Sign:
Note	: All question	ns are compulse	ory. Each questio	n will car	ry '1' mark and there is	no 'Negative Marking'
1)	What is a b	lockchain?				
.,	A blo a.) ledge block	ckchain is a c r consisting of s.	entralized digita	b.)	A blockchain is a dec digital ledger consist blocks.	centralized, distributed. ing of records called
	c.) A blo consis	ckchain is a d sting of recore	igital database ls called class.	d.)	None of the above	
2)	P2P stand	for	·			
	a.) Priva	te to Public	)	b.)	Password to Private	
	e.) Peer	to Peer		d.)	None of the above	
3)	The term u	sed for a bloc	kchain splits is			
	a.) A me	erger	T	1 6.	Afork	
	c.) A div	vision	(	d.)	None of the above	
4)	It is possib	le to program	a blockchain to	record t	ransactions automatic	ally. True/False.
	a) True			b.)	False	10 T
5)		is used for	storing bitcoins	;	1 - Y	
	a.) Block	K	()	) b.J	Wallet	
	c.) Both	A and B		d.)	None of the above	
6)	is	the type of le	edger present in	Blockch	ain.	
	a) Distr	ibuted Ledger		b.)	Decentralized Ledge	er
	c.) Both	A and B	0	d.)	None of the above	
7)	In blockch	ain, a block is	consist of			
``	a) A Tin	nestamo	0 /	b.)	Transaction data	and the second
	c.) A Ha	sh point		d.)	All of the above	
8)	Smart cont	racts are not 1	he legal docum	ents?		
	a.) Yes	- 0	)	b)	No	
	c.) Mavi	be		d.)	Can't say	
				,		

Scanned with CamScanner

- 9) What is a miner?
  - a.) A type of blockchain
    - e.) A person doing calculations to verify a transaction
- 10) What is the purpose of a nonce?
  - a.) Follows nouns
  - c.) Prevents double spending
- 11) What is a genesis block?
  - a) The first block of a Blockchain
  - c.) The first block after each block halving
- 12) True or False: Blockehain is the same as Bitcoin.

13) What is a Private Key?

14) Who invented Merkle Tree?

15) Who created Bitcoin?

b.) An algorithm that predicts the next part of the chain

Computers that validate and process blockchain transactions

b) A hash function

Sends information to the blockchain network

b.) A famous block that hardcoded a hash of the Book of Genesis onto the blockchain

- d.) The 2nd transaction of a Blockchain
- b.) False

d.)

- b.) A key given to the public
- d.) A key that opens the secret door
- b.) Rolph Wiggun
- d.) Vitalic Buterin
- b.) Samsung
- d.) China

----- For Departmental use only -----

Max. Marks: 15

Marks Obtained:

Name of Evaluator: Dr. Himanshu Rastof

Sign.