GOVERNMENT POLYTECHNIC, AMRAVATI

(AN AUTONOMOUS INSTITUTE OF GOVERNMENTOF MAHARASHTRA)

CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING / DIPLOMA IN INFORMATION TECHNOLOGY

COURSE CODE: FC5490

COURSE TITLE: EMERGING TRENDS INCOMPUTER ENGINEERING AND INFORMATION TECHNOLOGY

TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V		02	--	01	03	16	32	--	16

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
02	MAX.	35	15*	50	25#	25^	100
	MIN.	14		20	10	10	-

@: Internal Assessment #: External Assessment Skill based $: online examination

(*) Under the Theory PA, Out Of 15 Marks, 10 Marks is the Average of Two Tests and 05Marks are for Micro project-

(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.

For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) -40%.

1. RATIONALE:

Advancements and Applications of Computer engineering and Information Technology are ever changing Emerging trends aims at creating awareness about major trends that will define technological disruption in the upcoming years in the field of Computer engineering and Information Technology. There are some emerging areas expected to generate revenue, increasing demand as IT professionals and open avenues of entrepreneurship.

2. COURSE OUTCOMES (COs)

At the end of this course, student will be able to: -

1 Describe Artificial Intelligence ,machine learning and deep learning
2 Interpret Internet of Things concepts.
3 Describe Block Chain Fundamentals

3. DETAILED CONTENTS: THEORY

Unit	Unit Outcomes	Topics and Subtopics	CO No.	Marks	Hours
Unit-1 Artificial Intelligence	1a. Describe the concept of AI 1b. State the components of AI 1c. List Applications of AI 1d. Differentiate between machine learning & deep Learning	1.1 **Introduction of AI** • Concept • Scope of AI • Components of AI • Types of AI • Application of AI **1.2 Concept of Machine Learning and Deep Learning**	**1**	**07**	**06**
Unit 2 Internet of Things	2a. State the domains and application areas of Embedded Systems 2b.Describe IoT systems in which information and knowledge are inferred from data 2c.Describe designs of IoT 2d. State IoT Issues and challenges in deployment	**2.1 Embedded Systems:** • Embedded system concepts. • Purpose of Embedded system, • Architecture of Embedded system, • Types of Embedded processors–PIC,ARM, AVR, ASIC **2.2 Internet of Things : Definition and Characteristics of IoT** • Physical design of IoT o Things of IoT o IoT Protocols • Logical design of IoT, o IoT functional Blocks, o IoT communication models, o IoT communication APIs, • IoT Enabling Technologies • IoT levels and Deployment Templates, • Iot Issues and Challenges, Applications • IoT devices and its features: Arduino, Uno, Rasperry Pi, Node Microcontroller unit	**2**	**14**	**14**

Unit 3 **Basics of BlockChain**	3a.Introduction to Blockchain technology 3b.Describe the shortcomings of current systems 3c.Descibe Revolutionizing the Traditional Business 3d.Describe the technology used in Blockchain technology 3e.Exploring blockchain applications	**3.1Grasping Blockchain Fundamentals:** • Introduction to Blockchain • Tracing bolckchain's Origin • The shortcomings of current transaction systems, • The emergence of bitcoin, • The birth of blockchain, **3.2 Revolutionizing the Traditional Business Network** **3.3 Exploring a blockchain application examples** • Tracking vehicle ownership with and without blockchain • Recognizing the key business benefits, • Building trust with blockchain,Taking a Look at How Blockchain Works • Traditional database vs. Blockchain base distributed ledger 3.4 **Technology used in Blockchain :** • Cryptographic Keys, • Network Protocol, • Distributed Ledger Technology, • Hashing • Blockchain in Crypto currency 3.5 Advantages & Disadvantages of Blockchain	**3**	**14**	**12**

Note: About 10 -15% curriculum of this course shall be taught by external field/industry experts. The contents of the curriculum shall be reviewed every year and obtained the approval of PBoS, BoS and G.B. While reviewing the contents of the course curriculum the guidelines of an authorized apex body (such as CWC Central Water Commission for CE) of respective programme shall be taken into consideration.

4.LIST OF PRACTICALS:

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
1.	Write a simple program using PROLOG.	1
2	Write a program to transfer serial data on your thingspeak account using Node MCU	2
3	Write a program to transfer serial data on your thingspeak account using Raspberry Pi	2
4	Write a program to transfer data to thingspeak cloud using Interface LM35 Temperature sensor to Node MCU8266	2
5	Identify the use case in IOT application with blockchain and without blockchain and	3

	compare these applications with various parameters.	
6	Identify the use cases in integrity verification application with blockchain and without blockchain and compare these applications wih various parameters.	3

Note:

i) The entire above listed practical's need to be performed compulsorily, so that the students reach the `Precision level of Dave's Psychomotor Domain'.

ii) The 'Process' and 'Product' related skills associated with each PrO are to be assessed according to a suggested sample given below.

S. No.	Performance Indicators	Weightage in %
a.	Preparation of experimental setup	20
b.	Setting and operation	20
c.	Follow safety precautions	10
d.	Observations and Recording	10
e.	Interpretation of result and Conclusion	20
f.	Answer to sample questions	10
g.	Submission of report in time	10
	Total	100%

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a. Work collaboratively in team.
b. Follow ethical Practices

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organization Level' in 2nd year and
- 'Characterization Level' in 3rd year

5. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***Co-curricular*** activities which can be undertaken to accelerate the attainment of the various Outcomes in this course: Students should conduct following activities following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (students) portfolio which will be useful for their placement interviews:

a) Prepare report on suggestive case study of Hacking as given below:

i) The Aaron Cafferey case-United Kingdom ,2003
http://digitalcommons.law.scu.edu/cgi/viewcontent.gi?article=1370&context=chtlj

ii) The Julie Amero case-Connecticut,2007
http://dfir.com.br/wp-content/uploads/2014/02/julieamerosummary.pdf

iii) The Michael Fiola case-Massachusetts,2008
http://truthinjustice.org/fiola.htm

b) Prepare report on any given case study of IoT..

6. SUGGESTED INSTRUCTIONAL STRATEGIES

These are sample strategies, which the teacher can use to accelerate the attainment of the various learning outcomes in this course:

a. Massive open online courses (***MOOCs***) may be used to teach various topics/subtopics.
b. The teacher needs to ensure to create opportunities and provisions for ***co-curricular*** Activities.
c. About ***10-15% of the topics/sub-topics*** which is relatively simpler or descriptive in nature is to be given to the students for ***self-directed learning*** and assess the development of the LOs/COs through classroom presentations (see implementation Guideline for details).
d. Procure various materials required for practical exercises
e. Guide student(s) in undertaking micro-projects.
f. Demonstrate students thoroughly before they start doing the practice.
g. Observe continuously and monitor the performance of students in Lab.

7. SUGGESTED MICRO-PROJECTS.

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. She/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs.

The microproject could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than ***16 (sixteen) student engagement hours*** during the course. In the all semesters, the micro-project could be group-based(4 to 5 students) to build up the skill and confidence in every student to become problem solver so that she/he contributes to the projects of the industry.

A Suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

a) IoT Based Humidity and Temperature Monitoring
   i. The need of IoT Based Humidity and Temperature Monitoring .
   ii. The hardware requirements for designing this system.
   iii. The software requirements for designing this system.
   iv. Describe the circuit designed for this system along with its working
   v. Design an IoT application and mention how to store and retrieve a data on it.

b) IoT based Weather Monitoring System
   i. The need of IoT Based Weather Monitoring System
   ii. The hardware requirements for designing this system
   iii. The software requirements for designing this system.
   iv. Describe the circuit designed for this system along with its working
   v. Design an IoT application and mention how to store and retrieve a data on it .

c) Study Credit card fraud as an identity threat. Identify
   i. Use of digital media in carrying out fraud.
   ii. Vulnerability Exploided.
   iii. Effect of fraud.
   iv. Protection /Precaution to be taken against such frauds.

d) Create Case study of Block Chain being used in illegal activities in real world.
e) Create a Simple Blockchain in any suitable programming language.
f) Write a survey report on smart contracts

g) Identify the successful companies/products leveraging blockchain in di!erent tech industries (ecommerce, gaming, fintech, edtech, etc.)
h) Examples of programming languages being used to code and its structure on the blockchain

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8. MAJOR EQUIPMENTS/INSTRUMENTS REQUIRED

Sr No.	Equipment Name with Broad Specification	Practical No.
1	PROLOG	1
2	Node MCU and Peripherals (e.g. LEDs, Sensors like Temp. sensor LM35, Ultrasonic sensor etc.	2,3,4
3	Raspberry Pi	2,3.,4
4	Arduino IDE (Open source software)	2,3,4
5	Python Software	2,3,4

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	**Unit Title**	**Marks per Unit**	**Distribution of Theory Marks**		
			R Level	**U Level**	**A Level**
1	Artificial Intelligence	**10**	**4**	**4**	**2**
2	Internet of Things	**15**	**5**	**6**	**4**
3	Basics of Blockchain technology	**10**	**4**	**4**	**2**
Total		**35**	**13**	**14**	**08**

R= Remember, U= Understanding, **A**=Application and above (*Bloom's Revised taxonomy)*

***Note**: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table*

10. SUGGESTED LEARNING RESOURCES:

Sr.No.	Title Of Book	Author	Publication
1.	Artificial Intelligence	R.B.Mishra	PHI Learning Pvt. Ltd
2.	Introduction to Embedded Systems	Shibu K.V.	Tata Mcgraw Hill ISBN 978-0-07-014589-4
3.	Internet Of Things –A Hands –on Approach	Arshadeep Bahga,Vijay Madisetti	McGraw Hill Education, Private Limited,New Delhi,2010,ISBN:978-0-07-068178-1
4.	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction,	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,	Princeton University Press (July 19, 2016).

5	Blockchain for dummies	Tiana Luarence	John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030-5774,

11. SOFTWARE/LEARNING WEBSITES.

a) https://www.allitebooks.in/the-internet-of-things/
b) https://www.versatek.com/wp-content/uploads/2016/06/IoT-eBook-version5.pdf
c) Https://www.tutorialspoint.com/internet -of-things/intrnet-of-thins_tutorial.pdf
d) http://www.spmkck.co.in/Notes/Learning%20Internet%20of%20Things.pdf
e) https://docs.microsdoft.com/en-us/sysinternals/downloads/psloggedon
f) NPTEL online course : https://nptel.ac.in/courses/106/104/106104220/#
g) Udemy: https://www.udemy.com/course/build-your-blockchain-az/
h) EDUXLABS Online training :https://eduxlabs.com/courses/blockchain-technology-training/?tab=tab-curriculum
i) https://www.ibm.com/in-en/topics/what-is-blockchain
j) https://www.javatpoint.com/blockchain-tutorial
k) https://www.tutorialspoint.com/blockchain/index.htm
l) https://www.simplilearn.com/tutorials/blockchain-tutorial#why_learn_blockchain

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1.	Dr.P.P.Karde	H.O.D Information Technology	Govt. Polytechnic Amravati
2.	A.P.Jane	Lecturer in Information Technology	Govt. Polytechnic Amravati
3.	R.R.Bhoge	Lecturer in Information Technology	Govt. Polytechnic Amravati
4.	Dr.P.R.Satav	Lecturer in Computer Engineering	Govt. Polytechnic Amravati

Govt. Polytechnic, Programme Board of Studies (Information Technology) has approved the above course curriculum on and is adopted for Information Technology Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
INFORMATION TECHNOLOGY
GOVERNMENT POLYTECHNIC,AMRAVATI.

The General Board of Studies has approved the above course curriculum on

The Governing Body has approved the above course curriculum on_____