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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution Affiliated to VTU)

III Semester B. E. Examinations April/May-2024

Artificial Intelligence and Machine Learning

FOUNDATIONS OF CYBER PHYSICAL SYSTEMS

Time: 03 Hours *Maximum Marks: 100*

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, 9 and 10.

PART-A

			M	BT	CO
1	1.1	What is the use of Data Management Module in advance *CPS* architecture?	02	1	1
	1.2	Discuss awareness security and transport security.	02	2	2
	1.3	Identify the characteristics of Erasable Programmable Read-Only Memory (*EPROM*).	02	1	1
	1.4	Differentiate bit-organized and word-organized memory.	02	3	2
	1.5	Illustrate the Stereovision Tracking System.	02	3	2
	1.6	Write the examples for Low Speed and High Speed Serial Interconnection.	02	2	2
	1.7	Analyze the working of a smart sensor with an example.	02	2	2
	1.8	Write the examples for flow and fluid velocity sensors and automotive and transportation sensors.	02	2	2
	1.9	List the features of dynamic spectrum access (*DSA*).	02	2	2
	1.10	Illustrate typical underwater sensor system architecture.	02	3	2

PART-B

2	a	Discuss the components of the embedded system in detail.	08	2	1
	b	Describe any two applications of Cyber-Physical Systems.	08	2	2
3	a	Discuss the different processor architectures.	08	2	2
	b	Analyze the different functionalities of interrupts.	08	3	2
		OR			
4	a	Discuss *MIMD* computers in detail.	08	2	2
	b	Analyze the various characteristics of *CISC* and *RISC* machines.	08	3	2
5	a	Discuss the concept of Processor Complex or System on Chip (SoC) in detail.	08	2	2
	b	Differentiate Versa Local Bus Module Expansion (*VME* Bus) and Peripheral Component Interconnect 2.*x* (*PCI* Bus).	08	3	2
		OR			
6	a	Describe the Operating System services in detail.	08	2	1
	b	Discuss common physical memory hierarchy for an embedded system.	08	2	2

7	a	Illustrate the working of a smart sensor using *OODA* (Observe, Orient, Decide and Act) loop for modern *CPS* applications.	08	3	2
	b	Describe the *IP*-based sensor networks in detail.	08	2	2
		OR			
8	a	By considering an example, differentiate traditional and distributed sensor networks.	08	3	2
	b	Discuss the smart sensor network architecture in detail.	08	3	2
9	a	List and explain different types of actuators used in our daily life.	08	2	1
	b	Illustrate autonomous planning and goal management in path finding robot system.	08	3	2
		OR			
10	a	Discuss simple actuation mechanism and characteristics of actuators.	08	2	2
	b	Describe the shared control in a part picking robotic system.	08	3	2