Reg. No.:

Name :

VIT® BHOPAL
www.vitbhopal.ac.in

TERM END EXAMINATIONS (TEE) – MAY 2022

Programme	:	**B.Tech**	**Semester**	:	**Winter 2021-22**
Course Name	:	**Embedded Systems**	**Course Code**	:	**ECE4010**
Faculty Name	:	**Dr. Abhishek Joshi**	**Slot / Class No**	:	**B11+B12+B13 / 0477**
Time	:	**1½ hours**	**Max. Marks**	:	**50**

Answer ALL the Questions

Q. No.		Question Description	Marks
		PART - A (30 Marks)	
1	(a)	Draw a detailed hardware block diagram for contactless smart card system. The system verifies the card/user, and the system is utilized for financial transactions. Justify the choice of hardware peripherals which are part of this system.	10
		OR	
	(b)	Write an embedded C program for AT89C51 microcontroller to continuously toggle pin P1.7 without disturbing the rest of the pins of port P1.	10
2	(a)	Generate the timing diagram for SPI communication between two systems. The timing diagram should include the status of CS, SCLK, MOSI and MISO signals from master system. The master system should read a single byte of value 58h from the slave system. The transfer of data should take place at the falling edge of the clock and the internal register value of the slave system is 25h.	10
		OR	
	(b)	Draw FSM diagram for automatic washing machine. The FSM should imitate the real-world functionality of the embedded control for washing machine.	10
3	(a)	Provide details of real-time operating system architecture along with their functionalities. Also, differentiate between real-time OS and general-purpose OS with examples.	10
		OR	
	(b)	Draw the timing diagram for the scheduler which has opted for EDF scheduling for the following tasks: All tasks have release time = 0	10

Ti	Ei	Di	Pi
1	2	8	20
2	3	5	5
3	2	9	10

PART - B (20 Marks)

4 Communication protocols play a vital role in development of networked embedded systems. Provide a detailed comparison of wireless communication protocols including real-world examples to justify its requirement. 10

5 Write an embedded C code for building a small-scale embedded system which includes two switches and a 16x2 LCD screen. Based upon the position of the switch (ON/OFF), four possible combinations can be printed on the LCD screen. 10

Switch 1	Switch 2	LCD Value
OFF	OFF	0
OFF	ON	1
ON	OFF	2
ON	OFF	3

⇔⇔⇔