VIT Vellore Institute of Technology (Deemed to be University under section 3 of the UGC Act, 1956)	**Final Assessment Test – Winter 2023-24 Semester - May 2024**	
	Course code : BCSE305L	Slot: A2+TA2
	Course Title : Embedded Systems	Time: **Three Hours**
	Course Mode **: CBL**	Max. Marks: **100**
Emp Id: 10454	Faculty Name : M.Narayana Moorthi	School: SCOPE
	Class Number(s): Common to all A2+TA2 slots	Mobile No.: 9385448385

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE

Answer any TEN Questions

(10 X 10 = 100 Marks)

Sl. No:	Questions Text	E/A/T	Unit / Module No	Marks	BL	CO
1.	Draw the block diagram of an embedded system and compare and contrast Microprocessor and Microcontroller? Explain the architecture of 8051 Microcontroller with neat sketch? Power supply-ram-rom-timers-GPIO ports- diagram Tabulation about microprocessor and microcontroller- general external– single chip – internal— 8051 features- architecture diagram History- intel 1982- 8 bit – size of ram / rom-16 bit timers Registers – A/B – R0-R7 / SFR--	E	1	**10**	**1**	**1**
2.	What is watch dog timer? Identify any 5 applications of timers and counters and discuss the working of timers and counters. Write a program for the following? To generate a rectangular waveform of on time 25ms and off time 10mses. Write an 8051 C program to toggle only pin P1.5 continuously every 250msec. Use timer 0, mode2 to create the delay? Timers- counters – applications- like- washing machine- projector- cell phone- traffic signal – alarm clock--- about watch dog timer- TMOD-TCON fields- working principles- 8051 port interface diagram to generate waveform with required time and toggle pin	A	2, 7	**10**	**2**	**2**
3.	Briefly discuss the design process of an Embedded System namely **"ATM"** with the following illustrations?	T	3	**10**	**3**	**2**

<table>
<tr><td></td><td>(a) Identify the H/W and S/W Components?
(b) Discuss the working principle and design process with neat sketch?

About ATM
Block diagram
Hardware components list
Software modules
Working - descriptions</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.</td><td>Briefly discuss about the embedded programming development tools and discuss in detail about the code optimization techniques with an example to each?

IDE- 8051-KEIL –
Assembler/ compiler – debugging / host / target devices --- discussions
Code optimization – benefits- examples- like loop optimization – expression simplification --- procedure in lining ---</td><td>A</td><td>4</td><td>10</td><td>4</td><td>3</td></tr>
<tr><td>5.</td><td>List any 5 hard and soft real time systems. Compare and contrast RMS from EDF?
Schedule the following task table using RMS?
<table><tr><th>Task</th><th>Period</th><th>Execution Time</th></tr><tr><td>P1</td><td>3</td><td>1</td></tr><tr><td>P2</td><td>5</td><td>3</td></tr><tr><td>P3`</td><td>6</td><td>1</td></tr></table>
Example embedded systems
Tabulation
Utilization
Hyper period
Timeline graph – scheduling descriptions</td><td>T</td><td>5</td><td>10</td><td>5</td><td>4</td></tr>
<tr><td>6.</td><td>What is the interpretation of embedded networking protocols? Explain in detail the working of CAN bus architecture?
Diagram
Discussion</td><td>E</td><td>6</td><td>10</td><td>1</td><td>3</td></tr>
<tr><td>7.</td><td>State the design challenges and characteristics of an embedded system? Draw the schematic diagram and write an embedded program using 8051 for the following: A door sensor is connected to the P1.1 and buzzer is connected to P1.7. Monitor the door sensor and when it opens, sound the buzzer?</td><td>A</td><td>7</td><td>10</td><td>2</td><td>1</td></tr>
</table>

	Power , memory , size , cost --- Diagram Program code either assembly or embedded c					
8.	List any 10 sensors and actuators with their specifications and characteristics. Write the features of PIC microcontroller? Features of PIC microcontroller List of sensors – temperature- pressure – humidity - --- LED-LCD-Motors – specifications- characteristics -	A	2	**10**	**3**	
9.	Draw the CDFG for an embedded application namely fire alarm system. About fire alarm system – block diagram – pseudo code- Code- CDFG illustration	E	4	**10**	**4**	**3**
10.	Describe the features of handheld devices using ARM processor. ARM processor – registers- instruction sets – about handheld devices- example add/sub/mul/div with diagram--	T	3	**10**	**5**	
11.	What is UART? Write a program for 8051 to transfer the data “EXAM” serially at 9600 baud, 8 bit data, and 1 stop bit. Serial port – SCON / SBUF / program either assembly or embedded c	E	2	**10**	**1**	**4**
12.	Explain the memory interfacing techniques using encoders and decoders. Memory types – about decoder- encoder – interface diagram – memory mapping concepts -	A	2	**10**	**2**	**3**
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