

<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	How can we change the speed of a DC motor using PWM in PIC 16F886 microcontroller?
Option A:	By changing amplitude of Pulse
Option B:	By keeping fixed duty cycle
Option C:	By changing duty cycle
Option D:	By increasing power of Pulse
2.	The high speed memory between the CPU and main memory is called as-----
Option A:	Cache Memory
Option B:	Virtual memory
Option C:	Secondary memory
Option D:	Storage memory
3.	The registers that provide control and status information about Timer/Counters in 8051 is -----.
Option A:	IP, IE
Option B:	TMOD, TCON
Option C:	SCON, SBUF
Option D:	Flag register, Accumulator
4.	The higher and lower bytes of a 16-bit register DPTR in 8051 are represented respectively as
Option A:	LDPTR and HDPTR
Option B:	DPTRL and DPTRH
Option C:	DPH and DPL
Option D:	HDP and LDP
5.	What is the function of a watchdog timer (WDT)?
Option A:	It resets the system if applied voltage increased above threshold value
Option B:	It resets the system if applied voltage decreases below threshold value
Option C:	It resets the system if the software fails to operate properly.
Option D:	It resets the system if Power failure is detected.
6.	In the instruction “MOV TH1, #-3”, what is the value that is being loaded in the TH1 register?
Option A:	FCH
Option B:	FBH
Option C:	FDH
Option D:	FEH
7.	How much flash memory does the Atmega328 have?
Option A:	13K bytes
Option B:	32K bytes

Option C:	256K bytes
Option D:	16K bytes
8.	Which of the following are pipelining stages of ARM7?
Option A:	Fetch, Decode, Write
Option B:	Fetch, Decode, Execute, Write
Option C:	Fetch, Execute, Write
Option D:	Fetch, Decode, Execute
9.	Which of the following register of ARM7 is used as Program Counter?
Option A:	CPSR
Option B:	SPSR
Option C:	R14
Option D:	R15
10.	Which of the following tool convert assembly language program into Machine language program.
Option A:	Assembler
Option B:	Converter
Option C:	Compiler
Option D:	Interpreter

11.	Program Counter of CPU -----.
Option A:	Holds address of the next instruction to be executed from memory.
Option B:	Personal Computer
Option C:	Holds frequently used data.
Option D:	Holds frequently used instructions.
12.	How many address lines a memory chip of 64K capacity will have?
Option A:	16
Option B:	64
Option C:	15
Option D:	6
13.	Which of the following is not control signal of memory?
Option A:	Write (WR)
Option B:	Data bus (D7-D0)
Option C:	Chip Select (CS)
Option D:	Read (RD)
14.	What is DMA?
Option A:	It allows to store data in stack memory
Option B:	It allows to store data in virtual memory
Option C:	DMA allow IO devices to access/retrieve data directly from the main memory
Option D:	It allows to store data in cache memory
15.	Which of the following is not semiconductor memory?
Option A:	Static Random-Access-Memory (SRAM)
Option B:	Dynamic Random-Access-Memory (SRAM)
Option C:	Flash Memory
Option D:	Magnetic Tape

16.	Which of the following memory needs refreshing circuit?
Option A:	DRAM
Option B:	SRAM
Option C:	Flash Memory
Option D:	NVRAM
17.	When a program tries to access a page that is mapped in address space but not loaded in physical memory, then ----.
Option A:	Page fault occurs
Option B:	Fatal error occurs
Option C:	No error occurs
Option D:	Segmentation fault occurs
18.	----- port of 8051 is a multifunctioning port.
Option A:	P0
Option B:	P1
Option C:	P2
Option D:	P3
19.	Mode-1 of timer-0 in 8051 works with ----- bits
Option A:	13 bits
Option B:	8 bits
Option C:	16 bits
Option D:	32 bits
20.	RS1-RS0 bits of program status word (PSW) are 01. R1 register of selected bank refers to ----- memory location.
Option A:	19H
Option B:	11H
Option C:	01H
Option D:	09H

21.	Which of the following register of 8051 is used to hold 16 bits address?
Option A:	Program status Word (PSW)
Option B:	TMOD
Option C:	DPTR
Option D:	SCON
22.	How much internal RAM is available for user in 8051?
Option A:	256B
Option B:	128KB
Option C:	256KB
Option D:	128B
23.	----- is not a standard baud rate supported for serial communication?
Option A:	9600Kbps
Option B:	2400 bps
Option C:	4800 bps
Option D:	1200 bps

24.	MOV A, @R1 instruction
Option A:	Move contents of R1 into ACC
Option B:	Move ASCII of R1 into ACC
Option C:	Move contents of ACC into R1
Option D:	Move contents of RAM whose address is held by R1 into ACC
25.	MOV A, #12H MOV B, #04H DIV AB After executing above set of instructions, A = ---- and B = ----.
Option A:	A = 3 and B = 4
Option B:	A = 0 and B = 0
Option C:	A = 3 and B = 0
Option D:	A = 4 and B = 2
26.	8051 based system is working with 11.059MHz crystal frequency. Calculate number of machine cycles required to execute following set of instructions. MOV R3, #200 HERE: DJNZ R3, HERE RET
Option A:	403
Option B:	200
Option C:	202
Option D:	400
27.	During serial communication, the data available in ----- register will be sent to outside world through TX pin of 8051 micro-controller.
Option A:	Accumulator (A)
Option B:	SBUF
Option C:	SCON
Option D:	TCON
28.	How many GPIO pin of 8051 are needed to interface 4x3 matrix keypad?
Option A:	12
Option B:	8
Option C:	7
Option D:	16
29.	Due to RISC based architecture, ARM7 takes ----- cycle to effectively execute an instruction.
Option A:	3
Option B:	5
Option C:	12
Option D:	1
30.	Which Cortex core is suitable for anti-lock braking (ABS) system of vehicle application?
Option A:	Cortex-A
Option B:	Cortex-R
Option C:	Cortex-M
Option D:	Cortex-B

31.	LDR R0, [R1] instruction of ARM -----.
Option A:	Load contents of memory, whose address is held by R1 into R0.
Option B:	Load contents of R1 into R0
Option C:	Load contents of R0 into R1
Option D:	Load contents of R0 into memory, whose address is held by R1.
32.	Which of the following mode of ARM is used, when the processor encounters an instruction that is undefined or not supported by the implementation?
Option A:	System Mode
Option B:	Supervisory Mode
Option C:	Undefined Mode
Option D:	User Mode
33.	Which of the following register in ARM is used to store return address of subroutine?
Option A:	R0
Option B:	R13
Option C:	R15
Option D:	R14
34.	Thumb instructions of ARM consists of ----- bits.
Option A:	16
Option B:	8
Option C:	64
Option D:	32
35.	What is meant by R0 to R12 registers of ARM are orthogonal.
Option A:	Addition of all the registers is zero
Option B:	Instruction apply to R0 can equally applicable to R12.
Option C:	Product of any two register is zero
Option D:	All registers are out of phase.
36.	Which of the following is not supported by RISC architecture
Option A:	Length of all instructions is same
Option B:	Pipeline of execution
Option C:	Greater Complexity in hardware
Option D:	Reduced instruction set
37.	ADD A, 20H of 8051 store result in Accumulator after performing following operation.
Option A:	add contents of accumulator with immediate data 20H
Option B:	is invalid instruction
Option C:	perform logical AND operation with 20H
Option D:	data from location 20H added with Accumulator
38.	How much on chip flash memory is available in 89V51RD2 micro-controller?
Option A:	64Kbytes
Option B:	32Kbytes
Option C:	16KBytes
Option D:	1Kbytes

39.	10 bit, ADC is available in ATMEGA328P. Suppose $V_{REF} = 5V$ is connected to microcontroller and Analog voltage in 3V, Calculate decimal equivalent of output signal.
Option A:	53
Option B:	614
Option C:	512
Option D:	256
40.	Which of the following is not criteria to choose microcontroller in embedded system?
Option A:	Speed of the operation
Option B:	Microcontroller architecture
Option C:	Aesthetic of system
Option D:	Power consumption

Sr. No.	Q.1 or Q2 or Q3	5 marks each
1	Compare SRAM and DRAM memory	
2	Explain Direct cache mapping in microprocessor-based system.	
3	Explain primary and secondary memory in brief.	
4	Classify memory based on data retention capabilities.	
5	Compare CISC and RISC processor's architecture.	
6	Compare Harvard and Von Neumann architecture of microprocessor.	
7	Explain microcomputer based system in brief.	
8	Write features of 89V51, ATMEGA 328P microcontroller. A Microcontroller based embedded system is to be developed with 10 bit ADC, SPI serial interface, comparator and 1 KB of EPROM. Select suitable microcontroller for the same.	
9	Develop Embedded System for Real Time Clock using I2C.	
10	Develop microcontroller based system to control speed of DC motor with the help of variable resistor.	
11	Develop a system to read temperature in hall and display it on the LCD.	
12	Compare Microprocessor and Microcontroller.	
13	Draw and explain internal pin structure of P3 Port.	
14	Draw and Explain Memory organization of 8051.	
15	Explain TMOD register of 8051.	
16	Explain Program Status Word (PSW) register of 8051.	
17	Explain the concept of pipeline of ARM 7.	
18	Explain Data processing, Data Transfer, Control flow with the help of example.	
19	Explain Current Program Status Register of ARM7.	
20	Compare instructions ACALL and LCALL of 8051.	
21	Explain Assembler directive with the help of Examples.	

Sr. No.	Q.1 or Q2 or Q3	10 marks each
1	Develop an assembly language program for 8051 microcontroller to generate square waveform of 500Hz & 50% duty cycle at pin P3.4. Assume 8051 is operating at frequency 12 MHz. Use hardware timer 0 in mode 1 to generate delay.	
2	Develop assembly program of 8051 to perform following task. a) Load hexadecimal number 98 in R1 of bank-1 register. Write assembly language program to transfer data from R1 of bank-1 to R1 register of bank-2. b) Load hexadecimal number 98 in R1 of bank-1 register. Write assembly language program to transfer this data from R1 of Bank-1 to external memory location 0500H.	
3	Explain SCON register of 8051. Determine Hexadecimal number to be loaded in SCON register to configure UART of 8051 to receive and transmit 8 bits with variable baud rate data.	
4	Explain Cortex-A, Cortex-B and Cortex-C ARM Core. Select appropriate Cortex core to develop embedded system which enable various advance electronics feature in vehicle.	
5	Explain three stage pipelines of ARM7. Determine number of cycles required to execute 10 instructions of ARM7 program.	
6	A switch button and relay module are interfaced with 8051 microcontroller. Write assembly language program to turn ON relay if Switch button is pressed, otherwise Relay will remains OFF.	
7	Write assembly language program to send “---Mumbai University---” string from microcontroller 8051 to outside world with 9600bps baud rate.	
8	LCD 16x2 is interface with 8051. Write assembly language program to display “LCD” on screen.	
9	A system is to be developed with the help of 89V51RD2, RTC and Seven segment display to display time. Explain above embedded system with the help of interfacing diagram.	
10	What are the selection criteria to choose appropriate microcontroller to the embedded systems?	
11	Explain Virtual memory concept with memory management.	
12	Suppose five 8 bit numbers are stored from code memory location 500H onward. Find smallest number among them and store the result in accumulator	
13	A LED is interface with 8051 at P1.1 pin. 8051 is operating at 11.059MHz. Develop assembly language program to blink this LED with 1 second interval.	
14	Explain Interrupt of ARM7 with its vector table.	
15	Explain Interrupt of 8051.	
16	Explain ARM core data flow model.	
17	Explain all operating modes of ARM7.	
18	Explain timers of 8051 with the help of logical diagram.	
19	Explain a system which consists of Processor, L1 cache. L2 cache, Main memory and Secondary memory.	
20	Explain features of ARM7.	

# University of Mumbai

## Examinations Summer 2022

Program: Electronic & Telecommunication Engineering  
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Subject: Microcontroller

Course Code: ECC402

### Answer Key

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	A
Q3.	B
Q4	C
Q5	C
Q6	C
Q7	B
Q8.	D
Q9.	D
Q10.	A
Q11	A
Q12	A
Q13	B
Q14	C
Q15	D
Q16	A
Q17	A
Q18	D
Q19	C
Q20	D



<b>Question Number</b>	<b>Correct Option (Enter either 'A' or 'B' or 'C' or 'D')</b>
Q21.	C
Q22.	D
Q23.	A
Q24	D
Q25	D
Q26	A
Q27	B
Q28.	C
Q29.	D
Q20.	B
Q31	A
Q32	C
Q33	D
Q34	A
Q35	B
Q36	C
Q37	D
Q38	A
Q39	B
Q40	C