Bihar Engineering University, Patna
Special Examination - 2023

Course: B.Tech. ***Time: 03 Hours***

Code: 100504 ***Subject: Microprocessors*** ***Full Marks: 70***

Instructions:-

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
*(iv) Question No. **1** is compulsory.*

Q.1 Answer any seven question of the following: **[2 x 7 = 14]**

(a) How many flags does 8085 microprocessor has?
(i) 4 (ii)5 (iii) 6 (iv) 3

(b) Which output control signal is activated after every six oscillator periods while fetching the external program memory and almost remains high during internal program
(i) ALE (ii) $\overline{PSEN}$
(iii)$\overline{EA}$ (iv) All of the above

(c) JNC stands for :
(i) Jump if no carry, jumps if CY = 0
(ii) Jump if carry, jumps if CY = 1
(iii) Jump if no carry, jumps if CY = 1
(iv) Jump if carry, jumps if CY = 0

(d) Which among the single operand instructions complements the accumulator without affecting any of the flags?
(i) CLR (ii) SETB
(iii) CPL (iv) All of the above

(e) The system program used to translate directly an assembly language to machine language is called
(i)Compiler (ii) Assembler
(iii) Text editor (iv) Debugger

(f) What is the bit transmitting or receiving capability of mode-1 in serial communication?
(i) 8 bits (ii) 10 bits
(iii) 11 bits (iv) 12 bits

(g) Which byte has the capability to interrupt the slave when SM2 bit is assigned to be '1' after the initialization process in the multiprocessor mode of communication?
(i) Address byte (ii) Data byte
(iii) Both (i) and (ii) (iv) None of the above

(h) What is the possible range of transfer control for 8-bit relative address especially in 2's complement form with respect to the first byte of preceding instruction?
(i) -115 to 132 bytes (ii) -130 to 132 bytes
(iii) -128 to 127 bytes (iv) -115 to 127 bytes

(i) Which version of MCS-51 requires the necessary connection of external clock source to XTAL2 in addition to the XTAL1 connectivity to ground level?
(i) HMOS (ii) CHMOS
(iii) CMOS (iv) All of the above

(j) Which lines are utilized during the enable state of hardware flow control in DTE and DCE devices of RS232?
(i) CD and IR (ii) DSR and DTR
(iii) RTS and CTS (iv) None of the above

Q.2 (a) Explain the indexed addressing and rellative addressing in 8051 micro-controller. **[7]**

(b) Explain the various programming and debugging tools in 8051 micro-controller. **[7]**

Q.3	(a)	Explain the different types of buses used in microprocessor.	**[7]**
	(b)	What is Subroutine? Explain the execution of Subroutine function.	**[7]**
Q.4	(a)	Explain in detail about the addressing modes of 8051. Use example instructions for proper explanation.	**[7]**
	(b)	Explain the PSW flags and SFR's (Special function registers) of 8051 microcontroller and also write the type of SFR's.	**[7]**
Q.5	(a)	Write a program for 8051 to transmit ''WELCOME TO INDIA" at the display connected to port 1 at 9600 baud for external crystal frequency of 11.0592 MHz.	**[7]**
	(b)	Interface 4-digit seven-segment display with 8051 and write a program to display BCD number 1234 on it.	**[7]**
Q6.	(a)	How many 16-bit registers are available in 8051? Explain their functions.	**[7]**
	(b)	Name any four major differences between a microprocessor and a microcontroller.	**[7]**
Q.7	(a)	List the special function register associated with (i) Interrupt (ii) I/O ports (iii) Timers/Counters	**[7]**
	(b)	Explain the concept of memory banks and further comment on the structure of the internal RAM of 8051	**[7]**
Q.8	(a)	Explain the indexed addressing and relative addressing in 8051 micro-controller.	**[7]**
	(b)	Explain the various programming and debugging tools in 8051 micro-controller.	**[7]**

Q.9 Write short notes on ***any two*** of the following : **[7x 2=14]**

(a) Interrups

(b) I/O Ports

(c) Timers/Counters

Bihar Engineering University, Patna
B.Tech 1st Semester Exam - 2022

Course: B.Tech. ***Time: 03 Hours***
Code: 102101 ***SubjectPhysics (Electromagnrtism)*** ***Full Marks: 70***

Instructions:-
(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
*(iv) Question No. **1** is compulsory.*
(v) Symbols used (if any) have their usual meanings.

Q.1 Answer any seven question of the following: [2 x 7 = 14]

(a) Define electric polarization.
(b) Write down Laplace's equation.
(c) Define displacement current.
(d) What is the physical interpretation of bound charges.
(e) Define diamagnetism. Give two examples of diamagnetic materials.
(f) With necessary expression, explain standing wave ratio.
(g) What do you mean by skin effect?
(h) Explain the terms motional e.m.f. and transformer e.m.f.
(i) Differentiate between conduction and convection current.
(j) What is meant by retarded potential?

Q.2	(a) Find the electric field at a distance z above the centre of a circular loop (radius R) Carrying uniform linear chargeλ.		**[7]**
	(b) Write down the expression for electric field due to surface charge distribution of Volume charge density p.		**[7]**
Q.3	Derive the expression for Transmission coefficient of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.		**[14]**
Q.4	(a)	A point charge q is situated at a distance a from the centre of a grounded conduction sphere of radius R. Using the method of images, fond the potential outside the sphere.	**[7]**
	(b)	Explain Faraday cage? What is the electrical force inside a Faraday cage when it is struck by lightning?	**[7]**
Q.5	(a)	Derive continuity equation for current densities.	**[7]**
	(b)	State and derive Poynting theorem.	**[7]**
Q.6	(a)	Derive the boundary conditions for electrostatic field intensity and electric flux density at (i) the interface between two dielectrcs and (ii) the interface between a perfectr conductor and a dielectric.	**[7]**
	(b)	A long spherical cloud of radius r has a uniform volume charge distrivution of pv. Calculate the potential distribution and the electric field at any point in space	**[7]**

		using Poisson's and Laplace's equations.	
Q.7	(a)	A solenoid of radius 4 mm and length 2 cm has 150 turns/m and carries current 500 mA. Find- (i) $\|H\|$ at the centre (ii) $\|H\|$ at the ends of the solenoid	**[7]**
	(b)	Determine whether the following potential equations satisfy Laplace's equation or not: (i) $V = 2x^2 - 4y^2 + z^2$ (ii) $V = r^2 \cos \emptyset + \theta$	**[7]**
Q.8	(a)	State Amphere's circuit law. Write its application	**[7]**
	(b)	A hollow conducting cylinder has inner radius a and outer radius b and carries current I along the positive z-direction. Find H everywhere.	**[7]**
Q.9	Write short notes on any two of the following: (a) Transverse nature of electromagnetic waves propagating in vacuum (b) Energy carried by electromagnetic waves (c) Electromagnetic braking and its application (d) Electric field due to electric dipole		**[7×2=14]**

Bihar Engineering University, Patna
End Semester Examination - 2022

Course: B.Tech. | ***Semester: V*** | ***Time: 03 Hours***
Code: 100504 | ***Subject: Microprocessors*** | ***Full Marks: 70***

Instructions:-

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
*(iv) Question No. **1** is compulsory.*

Q.1 Choose the correct option of the following (Any seven question only): **[2 x 7 = 14]**

(a) How many flags does 8085 microprocessor has?
(i) 4 (ii) 5 (iii) 6 (iv) 3

(b) Total bit addressable area in RAM of 8051 microcontroller is____?
(i) 8 bytes (ii) 4 bytes (iii) 16 bytes (iv) 32 bytes

(c) Which output control signal is activated after every six oscillator periods while fetching the external program memory and almost remains high during internal program execution ?
(i) ALE (ii) $\overline{PSEN}$ (iii) $\overline{EA}$ (iv) All of the above

(d) What can be the oscillator period for the multiplication operation of A and B in accordance to 16-bit product especially in B:A registers?
(i) 12 (ii) 24 (iii) 36 (iv) 48

(e) JNC stands for :
(i) Jump if no carry, jumps if CY = 0
(ii) Jump if carry, jumps if CY = 1
(iii) Jump if no carry, jumps if CY = 1
(iv) Jump if carry, jumps if CY = 0

(f) PUSH and POP instructions are used to _____ and _____ respectively.
(i) Send the data from the stack, copy the data to the stack
(ii) Send the data to the stack, copy the data from the stack
(iii) All of the above
(iv) None of the above

(g) Which among the single operand instructions complements the accumulator without affecting any of the flags?
(i) CLR (ii) SETB (iii) CPL (iv) All of the above

(h) The Abbreviation for ALE is:-
(i) Address Latch Enable
(ii) Address Light External
(iii) Address Latch Eternal
(iv) None of the above

(i) The system program used to translate directly an assembly language to machine language is called
(i) Compiler
(ii) Assembler
(iii) Text editor
(iv) Debugger

(j) How many interrupts signals exist in 8085?
(i) 2 (ii) 3 (iii) 4 (iv) 5

P.T.O.

Q.2 (a) What is embedded system? Explain the architecture of an embedded system with neat block diagram. **[7]**

(b) Explain the architecture of 8-bit microprocessor. **[7]**

Q.3 (a) Explain the indexed addressing and relative addressing in 8051 micro-controller. **[7]**

(b) Explain the various programming and debugging tools in 8051 micro-controller. **[7]**

Q.4 Show the results of the following: **[14]**

(i)
```
MOV A, #35H
ANL A, 0FH
```

(ii)
```
MOV A,#04H
ORLA, 03H
```

(iii)
```
MOV A, #54H
XRL A,A
```

(iv)
```
CLR C
MOV A,#26H
RRC A
```

Q.5 (a) Explain the different types of buses used in microprocessor. **[7]**

(b) What is Subroutine? Explain the execution of Subroutine function. **[7]**

Q.6 (a) What do you mean by general purpose registers? Explain the various flags and status register in 8051. **[7]**

(b) List the various operations performed by the microprocessor. **[7]**

Q.7 (a) Explain in detail about the addressing modes of 8051. Use example instructions for proper explanation. **[7]**

(b) Explain the PSW flags and SFR's (Special function registers) of 8051 microcontroller and also write the type of SFR's. **[7]**

Q.8 (a) Define "OPCODE" and "OPERAND" with example. What do you understand by instruction set. Write the 3 categories of data transfer instructions. **[7]**

(b) Explain serial ports of 8051 microcontroller. Also discuss about registers used in serial communications. **[7]**

Q.9 Write short notes on any two of the following: **[7x2=14]**

(i) Interrups

(ii) I/O Ports

(iii) Timers/Counters

Code : 100504

B.Tech 5th Semester Special Exam., 2022

(New Course)

MICROPROCESSORS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct answer of any *seven* of the following : 2×7=14

(a) Which port does not represent quasi-bidirectional nature of I/O ports in accordance to the pin configuration of 8051 microcontroller?

(i) Port 0 (Pins 32–39)

(ii) Port 1 (Pins 1–8)

(iii) Port 2 (Pins 21–28)

(iv) Port 3 (Pins 10–17)

(b) Which value of disc capacitors is preferred or recommended especially when the quartz crystal is connected externally in an oscillator circuit of 8051?

(i) 10 pF

(ii) 20 pF

(iii) 30 pF

(iv) 40 pF

(c) Which pin in the shift register mode (mode 0) of serial communication allows the data transmission as well as reception?

(i) TXD

(ii) RXD

(iii) RB8

(iv) REN

(d) Which bit of opcode specifies the type of registers to be used in the register addressing mode?

(i) LSB

(ii) MSB

(iii) Both (i) and (ii)

(iv) None of the above

(e) Which form of instructions also belong to the category of logical instructions in addition to bitwise logical instructions?

(i) Single-operand instructions

(ii) Rotate instructions

(iii) Swap instructions

(iv) All of the above

(f) What kind of instructions usually affect the program counter?

(i) Call & Jump

(ii) Call & Return

(iii) Push & Pop

(iv) Return & Jump

(g) How many machine cycles are executed by the counters in 8051 in order to detect '1' to '0' transition at he external pin?

(i) One (ii) Two

(iii) Four (iv) Eight

(h) What is the maximum delay generated by the 12 MHz clock frequency in accordance to an auto-reload mode (mode 2) operation of the timer?

(i) 125 µs (ii) 250 µs

(iii) 256 µs (iv) 1200 µs

(i) Which processor has the necessity of manual optimization for the generation of assembly language code especially for the embedded systems?

(i) RISC

(ii) CISC

(iii) Both (i) and (ii)

(iv) None of the above

(j) Which characteristics of an embedded system exhibit the responsiveness to the assortments or variations in system's environment by computing specific results for real-time applications without any kind of postponement?

(i) Single-functioned characteristics

(ii) Tightly-constraint characteristics

(iii) Reactive and real-time characteristics

(iv) All of the above

2. (a) Draw the schematic for interfacing a stepper motor with 8051 micro-controller, and write a program for 8051 for changing speed and direction of the motor. 6

(b) Interface 8-bit DAC with microcontroller 8051. Write a program to generate saw-tooth wave using DAC. 8

3. *(a)* An overrun is said to occur in data reception whenever a new byte of data is received before the previously received byte has been read. Discuss two methods by which overruns might be detected by the 8051 program. 6

(b) A framing error is said to have occurred if the stop bit is not logic high. What mode can detect a framing error? 8

4. *(a)* Explain the synchronous and asynchronous communication in 8051. 7

(b) Assuming the crystal frequency is 10 MHz, write a program that will use timer *q* to interrupt the program after a delay of 2 ms. 7

5. *(a)* Explain the different types of embedded systems. 8

(b) Write the comparisons among 8-bit, 16-bit and 32-bit microcontrollers. 6

6. *(a)* Describe the internal architecture of the 8051 microcontroller with neat block diagram. 7

(b) What is a stack? Explain the operation of stack with an example. 7

7. *(a)* Enlist the various flags in the PSW register. Discuss the function of each flag. 7

(b) Explain why the data pointer is 16-bit wide and the stack pointer is 8-bit wide in 8051. Justify. 7

8. *(a)* Explain the immediate addressing and absolute addressing modes of 8051. 7

(b) Explain the logical instructions in 8051 with the help of examples. 7

9. *(a)* Explain the difference among PROM, EPROM and EEPROM. 7

(b) Explain the performance parameters of the microprocessor. 7

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Bihar Engineering University, Patna
Special Examination - 2023

Course: B.Tech. ***Time: 03 Hours***

Code: 100504 ***Subject: Microprocessors*** ***Full Marks: 70***

Instructions:-

(i) The marks are indicated in the right-hand margin.
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Q.1 Answer any seven question of the following: **[2 x 7 = 14]**

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(iv) Jump if carry, jumps if CY = 0

(d) Which among the single operand instructions complements the accumulator without affecting any of the flags?
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(iii) CPL (iv) All of the above

(e) The system program used to translate directly an assembly language to machine language is called
(i)Compiler (ii) Assembler
(iii) Text editor (iv) Debugger

(f) What is the bit transmitting or receiving capability of mode-1 in serial communication?
(i) 8 bits (ii) 10 bits
(iii) 11 bits (iv) 12 bits

(g) Which byte has the capability to interrupt the slave when SM2 bit is assigned to be '1' after the initialization process in the multiprocessor mode of communication?
(i) Address byte (ii) Data byte
(iii) Both (i) and (ii) (iv) None of the above

(h) What is the possible range of transfer control for 8-bit relative address especially in 2's complement form with respect to the first byte of preceding instruction?
(i) -115 to 132 bytes (ii) -130 to 132 bytes
(iii) -128 to 127 bytes (iv) -115 to 127 bytes

(i) Which version of MCS-51 requires the necessary connection of external clock source to XTAL2 in addition to the XTAL1 connectivity to ground level?
(i) HMOS (ii) CHMOS
(iii) CMOS (iv) All of the above

(j) Which lines are utilized during the enable state of hardware flow control in DTE and DCE devices of RS232?
(i) CD and IR (ii) DSR and DTR
(iii) RTS and CTS (iv) None of the above

Q.2 (a) Explain the indexed addressing and rellative addressing in 8051 micro-controller. **[7]**

(b) Explain the various programming and debugging tools in 8051 micro-controller. **[7]**

Q.3	(a)	Explain the different types of buses used in microprocessor.	**[7]**
	(b)	What is Subroutine? Explain the execution of Subroutine function.	**[7]**
Q.4	(a)	Explain in detail about the addressing modes of 8051. Use example instructions for proper explanation.	**[7]**
	(b)	Explain the PSW flags and SFR's (Special function registers) of 8051 microcontroller and also write the type of SFR's.	**[7]**
Q.5	(a)	Write a program for 8051 to transmit ''WELCOME TO INDIA" at the display connected to port 1 at 9600 baud for external crystal frequency of 11.0592 MHz.	**[7]**
	(b)	Interface 4-digit seven-segment display with 8051 and write a program to display BCD number 1234 on it.	**[7]**
Q6.	(a)	How many 16-bit registers are available in 8051? Explain their functions.	**[7]**
	(b)	Name any four major differences between a microprocessor and a microcontroller.	**[7]**
Q.7	(a)	List the special function register associated with (i) Interrupt (ii) I/O ports (iii) Timers/Counters	**[7]**
	(b)	Explain the concept of memory banks and further comment on the structure of the internal RAM of 8051	**[7]**
Q.8	(a)	Explain the indexed addressing and relative addressing in 8051 micro-controller.	**[7]**
	(b)	Explain the various programming and debugging tools in 8051 micro-controller.	**[7]**
Q.9		Write short notes on ***any two*** of the following :	**[7x 2=14]**
	(a)	Interrups	
	(b)	I/O Ports	
	(c)	Timers/Counters	

Bihar Engineering University, Patna

B. Tech. 8th Semester Examination, 2024(S)

Course: B. Tech. ***Time: 03 Hours***
Code: 100504 ***Subject: Microprocessors*** ***Full Marks: 70***

Instructions: -

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
*(iv) Question No. **1** is compulsory.*

Q.1 ***Answer of the following questions (any seven only):-*** **[2 x 7 = 14]**

(a) What is the basic architecture of an 8-bit microprocessor?
(b) What is the role of the Program Counter in the 8051 microcontroller?
(c) What is the significance of the RESET circuit in the 8051 microcontroller?
(d) Explain register addressing with an example.
(e) What is indexed addressing, and how is it used in the 8051?
(f) How is memory interfacing achieved in microprocessors?
(g) How does the SPI protocol differ from the I2C protocol?
(h) What are the key features of RS232 communication?
(i) What are the common applications of microcontrollers in automotive systems?
(j) Describe the function of the Stack Pointer in the 8051 architecture.

Q.2 (a) Explain with a neat sketch the counter/timer logic diagram of 8051 microcontroller **[7]**
(b) Write an assembly language program in 8051 microcontroller to generate 1 Mz square wave at port 1.5. Assume crystal frequency as 12 MHz **[7]**

Q.3 (a) Explain about TMOD and TCON registers of 8051 microcontroller. **[7]**
(b) Explain the fundamental architecture of an 8-bit microprocessor and microcontroller. **[7]**

Q.4 (a) Discuss the function of SFRs (Special Function Registers) in the 8051 microcontroller. **[7]**
(b) Discuss the data transfer instructions of the 8051 with examples. **[7]**

Q.5 (a) Explain debugging tools used in 8051 programming with examples. **[7]**
(b) Explain the role of timers and counters in the 8051 microcontroller and their interfacing. **[7]**

Q.6 Compare synchronous and asynchronous communication. Explain the working of RS232 protocol and its interfacing with the 8051 microcontroller. **[14]**

Q.7 Describe the process of interfacing a keyboard with the 8051 microcontroller. Explain the key scanning technique. **[14]**

Q.8 Explain how DACs are interfaced with the 8051 microcontroller to generate analog signals. **[14]**

Q.9 Explain the various addressing modes of the 8051 microcontroller with examples. How do these modes enhance programming flexibility? **[14]**

Bihar Engineering University, Patna

B.Tech. 5th Semester Examination, 2023

Course: B.Tech. ***Time: 03 Hours***

Code: 100504 ***Subject: Microprocessors*** ***Full Marks: 70***

Instructions:-

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
*(iv) Question No. **1** is compulsory.*

Q.1 Choose the correct answer of the following (Any seven question only): **[2 x 7 = 14]**

(a) For 16-bit operations, register E can be paired with what register?
(i) A (ii) B
(iii) C (iv) D

(b) Which of the following control signal becomes high in T1 clock cycle and remains deactivated in T2 clock cycle and onwards?
(i) ALE (ii) $\overline{PSEN}$
(iii) $\overline{EA}$ (iv) All of the above

(c) JP instruction in 8085 performs branch if:
(i) Carry flag is 1 (ii) Parity flag is 1
(iii) Sign flag is 0 (iv) Auxiliary carry flag is 0

(d) The instruction to copy the content of a memory location using a register indirect addressing mode is?
(i) STAX (ii) LDAX
(iii) LDA (iv) None of the above

(e) Which of the following statement is true for the instruction PUSH B
(i) It is an arithmetic instruction (ii) Executes in single machine cycle
(iii) It reads from memory location (iv) It performs memory write operation

(f) The number of pins in 8051 microcontroller is?
(i) 64 (ii) 44
(iii) 40 (iv) 100

(g) The value of RAM is to ROM size ratio is lower in?
(i) Microprocessor based systems (ii) Microcontroller based systems
(iii) Both (i) and (ii) (iv) None of the above

(h) The number of hardware interrupts in 8051 is?
(i) 2 (ii) 3
(iii) 4 (iv) 5

(i) Which member of MCS-51 family contains an internal ROM of 0 KB?
(i) 8051 (ii) 8951
(iii) 8031 (iv) None of the above

(j) Which of the following statement is false regarding the RTS and CTS signals?
(i) RTS is on the receiver side (ii) CTS is on the transmitter side
(iii) RTS is made low at first (iv) CTS is made low at first

Q.2 (a) What is an embedded system? Describe the salient features and characteristics of an embedded system. **[7]**

(b) How does an MCS-51 family microcontrollers find use in embedded systems? **[7]**

Q.3 (a) Explain how the address and data information is separated on the address data pins of 8085 microprocessor during the instruction fetch and execution stages. **[7]**

(b) What are the different program development tools used in microprocessor and microcontrollers? **[7]**

Q.4 (a) What are the different addressing modes used in microprocessor? Explain with suitable instruction examples. **[7]**

(b) What are the different instruction types supported in 8085 microprocessor? Explain with suitable instruction examples. **[7]**

Q.5 (a) Describe the memory organization in 8051 microcontroller. **[7]**

(b) Explain the functions of SP and PC registers in 8051 microcontroller. **[7]**

Q.6 (a) Write a C or assembly language program for 8051 microcontroller to create a travelling light pattern connected at port 0 after every 500 ms. Assume there are 8 LEDS connected to 8 pins of port 0. Initially after startup, the LED connected to Pin 0 should be ON. Then after 500 ms, the next LED should be ON. Only one LED should be ON at a time and remaining should stay OFF. Continue this pattern forever. Assume the crystal frequency to be 12 MHz. **[7]**

(b) Interface 4-digit seven-segment display with 8051 and write a program to display BCD numbers from 0-9 after every 1 second. **[7]**

Q.7 (a) What are the branching instructions in 8051? Explain with suitable examples. **[7]**

(b) Explain the following instructions: **[7]**
(i) CJNE (ii) DJNZ

Q.8 (a) Explain the special function registers associated with the I/O Ports. How to configure an I/O port as an input pin? **[7]**

(b) What are the special function registers associated with the interrupt module of 8051? **[7]**

Q.9 Write short notes on ***any two*** of the following: **[7×2=14]**

(a) Counters
(b) Interfacing a stepper motor
(c) Memory Interfacing

Bihar Engineering University, Patna

B.Tech 5th Semester Examination, 2024

Course: B.Tech ***Time: 03 Hours***
Code: 100504 ***Subject: Microprocessor*** ***Full Marks: 70***

Instructions: -

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
*(iv) Question No. **1** is compulsory.*

Q.1 ***Choose the correct option / answer the following (Any seven question only):*** **[2 x 7 = 14]**

(a) The Program Counter (PC) in 8051 is how many bits?
(i) 8-bit (ii) 16-bit
(iii) 12-bit (iv) 32-bit

(b) In 8051, which register is used to enable or disable interrupts?
(i) IE (ii) IP
(iii) TCON (iv) PCON

(c) Which of the following microcontrollers is based on the Harvard architecture?
(i) Intel 8085 (ii) Intel 8086
(iii) Intel 8051 (iv) ARM Cortex

(d) The default start value of Stack Pointer after reset in 8051 is:
(i) 00H (ii) 10H
(iii) FFH (iv) 07H

(e) Which type of memory in 8051 is bit-addressable?
(i) Entire RAM (ii) Register bank
(iii) 16 bytes of internal RAM from 20H to 2FH (iv) Entire ROM

(f) A timing diagram shows:
(i) Logical output of program (ii) Voltage transitions with respect to time
(iii) Machine code of instruction (iv) Bus architecture

(g) What is the function of ALE signal in 8051?
(i) Latches lower address byte (ii) Enables timers
(iii) Selects internal memory (iv) Controls interrupt

(h) Which pin of RS232 connector is used for Transmit Data (TXD)?
(i) Pin 2 (ii) Pin 1
(iii) Pin 4 (iv) Pin 3

(i) How many lines are used in the basic SPI communication?
(i) 5 (ii) 2
(iii) 4 (iv) 3

(j) Which protocol supports multi-master configuration?
(i) UART (ii) I2C
(iii) RS232 (iv) SPI

Q.2	(a)	Demonstrate the Special Function Registers in 8051.	**[7]**
	(b)	Explain the functions and programming associated to Interrupt Controller block in 8051.	**[7]**
Q.3	(a)	Discuss the Functions associated to all I/O Port pins in 8051.	**[7]**
	(b)	Demonstrate interfacing of a 4x4 (16-key) keyboard with 8051, with neat circuit diagram and display using 8051 Microcontroller.	**[7]**
Q.4	(a)	Explain the oscillator circuit and timing of the 8051 microcontrollers.	**[7]**
	(b)	Explain the interfacing of Bluetooth and Zigbee with the 8051 Microcontroller.	**[7]**
Q.5		Illustrate the pin diagram of 8051 with the help of a suitable diagram and explain the utility of the pins available in 8051.	**[14]**
Q.6	(a)	What is a Timer circuit? Explain the Timer operations associated to 8051 microcontrollers by using Timer Registers.	**[7]**
	(b)	Explain the internal memory organization of the microcontroller 8051.	**[7]**
Q.7	(a)	Explain different types of buses used in 8-bit microprocessor.	**[7]**
	(b)	Define subroutine. Explain the execution of subroutine function.	**[7]**
Q.8		With the help of schematic diagram, explain the interfacing of stepper motor with 8051 Microcontroller. Also, write ALP to change the speed and direction of motor.	**[14]**
Q.9		Write short notes on ***any two*** of the following: (a) Overview of 8051 family (b) Stack & Stack Pointer (c) Register IE format of 8051 (d) Various addressing modes of 8051 microcontroller	**[7 x 2 = 14]**