Subject: -Digital Electronics and Microcontroller Applications (22421)

SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Logic Gate and Logic Families	30
2	Combinational Logic and Sequential logic Circuit	16
3	Basic Microprocessor and 8051 Microcontroller	20
4	8051 Instruction set and Programming	18
5	8051 Memory, I/O Device Interfacing and Application	18
	Total Marks :-	102

BOARD THEORY PAPER PATTERN FOR DEM (22421)

Q.1		**Attempt any FIVE** **5*2=10**
	a)	**Logic Gate and Logic Families**
	b)	**Combinational Logic and Sequential logic Circuit**
	c)	**Basic Microprocessor and 8051 Microcontroller**
	d)	**8051 Instruction set and Programming**
	e)	**8051 Memory, I/O Device Interfacing and Application**
	f)	**Basic Microprocessor and 8051 Microcontroller**
	g)	**8051 Instruction set and Programming**
Q.2		**Attempt any THREE** **3*4=12**
	a)	**Logic Gate and Logic Families**
	b)	**Combinational Logic and Sequential logic Circuit**
	c)	**Basic Microprocessor and 8051 Microcontroller**
	d)	**8051 Instruction set and Programming**
Q.3		**Attempt any THREE** **3*4=12**
	a)	**Combinational Logic and Sequential logic Circuit**
	b)	**Basic Microprocessor and 8051 Microcontroller**
	c)	**8051 Instruction set and Programming**
	d)	**8051 Memory, I/O Device Interfacing and Application**
Q.4		**Attempt any FOUR** **3*4=12**
	a)	**Combinational Logic and Sequential logic Circuit**
	b)	**Basic Microprocessor and 8051 Microcontroller**
	c)	**8051 Instruction set and Programming**
	d)	**8051 Memory, I/O Device Interfacing and Application**
	e)	**Basics of Microprocessor and 8051 Microcontroller**
Q.5		**Attempt any TWO** **2*6=12**

	a)	**8051 Instruction set and Programming**
	b)	**8051 Memory, I/O Device Interfacing and Application**
	c)	**Basics of Microprocessor and 8051 Microcontroller**
Q.6		**Attempt any TWO 2*6=12**
	a)	**8051 Instruction set and Programming**
	b)	**8051 Memory, I/O Device Interfacing and Application**
	c)	**Basics of Microprocessor and 8051 Microcontroller**

CLASS TEST - I

PAPER PATTERN

Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
1	**Logic Gate and Logic Families**	**CO-421.1**
2	**Combinational Logic and Sequential logic Circuit**	**CO-421.2**
3	**Basic Microprocessor and 8051 Microcontroller**	**CO-421.3**

Q.1	**Attempt any FOUR** **4*2=8Marks**	Course Outcome (CO)
a)	Basics of Microprocessor and 8051 Microcontroller	**CO-421.1**
b)	8051 instruction set & programming	**CO-421.2**
c)	Basics of Microprocessor and 8051 Microcontroller	**CO-421.1**
d)	8051 timers, Interrupts, Serial & Parallel communication	**CO-421.3**
e)	Basics of Microprocessor and 8051 Microcontroller.	**CO-421.1**
f)	8051 instruction set & programming	**CO-421.2**
Q.2	**Attempt any THREE** **3*4=12 Marks**	
a)	8051 instruction set & programming	**CO-421.2**
b)	8051 timers, Interrupts, Serial & Parallel communication	**CO-421.3**
c)	Basics of Microprocessor and 8051 Microcontroller.	**CO-421.1**
d)	8051 instruction set & programming	**CO-421.2**

CLASS TEST - II

PAPER PATTERN

Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
3	**Basic Microprocessor and 8051 Microcontroller**	**CO-421.3**
4	**8051 Instruction set and Programming**	**CO-421.4**
5	**8051 Memory, I/O Device Interfacing and Application**	**CO-421.5**

Q.1	**Attempt any FOUR** **4*2=8Marks**	**Course Outcome (CO)**
a)	Applications of 8051 microcontroller	**CO-421.5**
b)	Memory & I/O device Interfacing	**CO-421.4**
c)	8051 timers, Interrupts, Serial & Parallel communication	**CO-421.3**
d)	Applications of 8051 microcontroller	**CO-421.5**
e)	Memory & I/O device Interfacing	**CO-421.4**
f)	8051 timers, Interrupts, Serial & Parallel communication	**CO-421.3**
Q.2	**Attempt any THREE** **3*4=12 Marks**	
a)	8051 timers, Interrupts, Serial & Parallel communication	**CO-421.3**
b)	Applications of 8051 microcontroller	**CO-421.5**
c)	Memory & I/O device Interfacing	**CO-421.4**
d)	Applications of 8051 microcontroller	**CO-421.5**

COURSE OUTCOME (CO)

COURSE: -DIGITAL ELECTRONICS AND MICROCONTROLLER APPLICATIONS (22421)
PROGRAMME: - Electrical Engineering

CO.NO	Course Outcome
CO-421.1	Analyze architecture of different microcontroller IC's.
CO-421.2	Interpret the program for 8051 in assembly language for the given applications.
CO-421.3	Interpret the program by using timer, interrupt and serial ports/parallel port.
CO-421.4	Interface the memory & I/O devices to 8051 microcontroller.
CO-421.5	Maintain microcontroller used in different applications.

1. Logic Gate and Logic Families

Position in Question Paper **Total Marks-18**

Q.1. a) 2-Marks.
Q.1. c) 2-Marks.
Q.2. b) 4-Marks.
Q.5. c) 4-Marks.
Q.6. a) 2-Marks
Q.3. c) 4-Marks

Descriptive Question

1) Difference between microcontroller & microprocessor.
2) Difference between Von-Neuman & Harward Architecture.
3) State Features of 8051.
4) Explain the functioning of following pins:
   a) PSEN
   b) ALE
   c) EA
   d) RESET
5) Short Note on Following:
   a) DPTR
   b) Program Counter
   c) Stack Pointer
   d) Accumulator
6) Explain PSW Register.
7) Describe Power Saving Options in 8051.
8) Draw Memory organization of 8051

MCQ Question

(Total number of Question=Marks*3=18*3=54)

Note: Correct answer is marked with **bold**

1. 8051 microcontrollers are manufactured by which of the following companies?
   a) Atmel
   b) Philips
   c) Intel
   d) All of the mentioned
2. AT89C2051 has RAM of
   a) 128 bytes
   b) 256 bytes
   c) 64 bytes
   d) 512 bytes
3. 8051 series has how many 16 bit registers?
   a) 2
   b) 3
   c) 1
   d) 0
4. When 8051 wakes up then 0x00 is loaded to which register?

a) PSW
c) PC
b) SP
d) None of the mentioned

5.When the microcontroller executes some arithmetic operations, then the flag bits of which register are affected?
a) PSW
c) DPTR
b) SP
d) PC

6. On power up, the 8051 uses which RAM locations for register R0- R7
a) 00-2F
c) 00-7F
b) 00-07
d) 00-0F

7. How many bytes of bit addressable memory is present in 8051 based microcontrollers?
a) 8 bytes
c) 16 bytes
b) 32 bytes
d) 128 bytes

8. How many types of architectures are available, for designing a device that is able to work on its own?
a) 3
c) 1
b) 2
d) 4

9. Which architecture is followed by general purpose microprocessors?
a) Harvard architecture
c) None of the mentioned
b) Von Neumann architecture
d) All of the mentioned

10. Which architecture provides separate buses for program and data memory?
a) Harvard architecture
c) None of the mentioned
b) Von Neumann architecture
d) All of the mentioned

11. Which microcontroller doesn't match with its architecture below?
a) Microchip PIC- Harvard
c) ARM7- Von Neumann
b) MSP430- Harvard
d) ARM9- Harvard

12. Harvard architecture has _____
a) dedicated buses for data and program memory
b) pipeline technique
c) complex architecture
d) all of the mentioned

13. Which out of the following supports Harvard architecture?
a) ARM7
c) SHARC
b) Pentium
d) All of the mentioned

14. Why most of the DSPs use Harvard architecture?
a) they provide greater bandwidth
b) they provide more predictable bandwidth
c) they provide greater bandwidth & also more predictable bandwidth
d) none of the mentioned

15. Which of the two architecture saves memory?

a) Harvard
b) Von Neumann
c) Harvard & Von Neumann
d) None of the mentioned

16. A microcontroller at-least should consist of:
a) RAM, ROM, I/O ports and timers
b) CPU, RAM, I/O ports and timers
c) CPU, RAM, ROM, I/O ports and timers
d) CPU, ROM, I/O ports and timers

17. Unlike microprocessors, microcontrollers make use of batteries because they have:
a) high power dissipation
b) low power consumption
c) low voltage consumption
d) low current consumption

18. What is the order decided by a processor or the CPU of a controller to execute an instruction?
a) decode,fetch,execute
b) execute,fetch,decode
c) fetch,execute,decode
d) fetch,decode,execute

19. If we say microcontroller is 8-bit then here 8-bit denotes size of:
a) Data Bus
b) ALU
c) Control Bus
d) Address Bus

20. How are the performance and the computer capability affected by increasing its internal bus width?
a) it increases and turns better
b) it decreases
c) remains the same
d) internal bus width doesn't affect the performance in any way

21. Abbreviate CISC and RISC.
a) Complete Instruction Set Computer, Reduced Instruction Set Computer
b) Complex Instruction Set Computer, Reduced Instruction Set Computer
c) Complex Instruction Set Computer, Reliable Instruction Set Computer
d) Complete Instruction Set Computer, Reliable Instruction Set Computer

22. Give the names of the buses present in a controller for transferring data from one place to another?
a) data bus, address bus
b) data bus
c) data bus, address bus, control bus
d) address bus

23. What is the file extension that is loaded in a microcontroller for executing any instruction?
a) .doc
b) .c
c) .txt
d) .hex

24. What is the most appropriate criterion for choosing the right microcontroller of our choice?
a) speed
b) availability
c) ease with the product
d) all of the mentioned

25. Why microcontrollers are not called general purpose computers?
a) because they have built in RAM and ROM
b) because they design to perform dedicated task

c) because they are cheap
d) because they consume low power

26.When the 8051 is reset and the line is HIGH, the program counter points to the first program instruction in the:

a)Internal code memory c) Internal data memory
b) External code memory d)External data memory

27.An alternate function of port pin P3.4 in the 8051 is:

a) **Timer 0** c) Interrupt 0
b) Timer 1 d) Interrupt 1

28. The I/O ports that are used as address and data for external memory are:

a)Ports 1 and 2 c) Ports 0 and 2
b) Ports 1 and 3 d)Ports 0 and 3

29.The 8051 has _____ parallel I/O ports.

a)2 c)4
b)3 d)5

30. The total external data memory that can be interfaced to the 8051 is:

a)32K c)128K
b)64K d)256K

31. Bit-addressable memory locations are:

a)10H through 1FH c)30H through 3FH
b)20H through 2FH d)40H through 4FH

32.The 8-bit address bus allows access to an address range of:

a)0000 to FFFFH c)**00 to FFH**
b)000 to FFFH d)0 to FH

33. The number of data registers is:

a)8 c)32
b)16 **d)64**

34.When the 8051 is reset and the EA line is LOW, the program counter points to the first program instruction in the:

a)Internal code memory c) Internal data memory
b) External code memory d) External data memory

35. The I/O port that does not have a dual-purpose role is:

a) Port 0 c) Port 2
b) Port 1 d) Port 3

36. The total amount of external code memory that can be interfaced to the 8051 is:

a)32K **c)**128K
b)64K **d)**256K

37. A HIGH on which pin resets the 8051 microcontroller?

a)RESET c)PSEN
b)RST d)RSET

38.An alternate function of port pin P3.1 in the 8051 is:

a)serial port input c)memory write strobe
b)serial port output d)memory read strobe

39.An alternate function of port pin P3.0 (RXD) in the 8051 is:

a)serial port input c)memory write strobe

b)serial port output d)memory read strobe

40.What is true about microcontroller?

a)a microcontroller is a small and low-cost microcomputer

b) it is designed to perform the specific tasks of embedded systems

c)microcontroller consists of the processor, the memory, serial ports, peripherals.

d) all of the above

41.Which is false about microcontroller?

a)microcontrollers are used to execute a single task within an application.

b)it consists of cpu, ram, rom, i/o ports.

c) its power consumption is high because it has to control the entire system.

d)it is built with cmos technology

42.This type of microcontroller is generally used in automatically controlled appliances like automatic operational machines.

a) 8-bit microcontroller **c) 32-bit microcontroller**

b) 16-bit microcontroller d) 64-bit microcontroller

43Which of the following is an example of Embedded memory microcontroller?

a) intel 8031 microcontroller c) intel 8081 microcontroller.

b) intel 8051 microcontroller. d) intel 8085 microcontroller

44. At what PIN number, there is a RESET pin, which is used to reset the microcontroller to its initial values?

a)pin 9 c) pin 30

b) pin 20 d) pin 35

45.At what PIN number, there is EA pin which stands for External Access input?

a)pin 28 **c) pin 30**

b) pin 29 d) pin 31

46.When pins are configured as an output (i.e. logic 0), then the single port pins can receive a current of?

a) 5ma c) 15ma

b) 8ma **d) 10ma**

47.Which IO Port can be used for higher address byte with addresses A8-A15?

a) port1 c) port3

b) port0 **d) port2**

48.Microprocessor consists of?

a)ALU c) control unit

b) register array **d) all of the above**

49.Which of the following is not a features of a Microprocessor?

a) versatility **c) low bandwidth**

b) reliability d) low power consumption

50.What is false about microprocessor?

a)the microprocessor is of small size chip, hence is not portable.

b)microprocessor chips are available at low prices

c) microprocessors are versatile
d) failure rate of an ic in microprocessors is very low

51. How are the status of the carry, auxiliary carry and parity flag affected if the write instruction
MOV A,#9C
ADD A,#64H

a) CY=0,AC=0,P=0
b) CY=1,AC=1,P=0
c) CY=0,AC=1,P=0
d) CY=1,AC=1,P=1

52. How are the bits of the register PSW affected if we select Bank2 of 8051?

a) PSW.5=0 and PSW.4=1
b) PSW.2=0 and PSW.3=1
c) PSW.3=1 and PSW.4=1
d) PSW.3=0 and PSW.4=1

53. If we push data onto the stack then the stack pointer

a) increases with every push
b) decreases with every push
c) increases & decreases with every push
d) none of the mentioned

54. Why microcontrollers are not called general purpose computers?

a) because they have built in RAM and ROM
b) because they design to perform dedicated task
c) because they are cheap
d) because they consume low power

55. To initialize any port as an output port what value is to be given to it?

a) 0xFF
b) 0x00
c) 0x01
d) A port is by default an output port

56. Which out of the four ports of 8051 needs a pull-up resistor for using it is as an input or an output port?

a) PORT 0
b) PORT 1
c) PORT 2
d) PORT 3

57. Which of the ports act as the 16 bit address lines for transferring data through it?

a) PORT 0 and PORT 1
b) PORT 1 and PORT 2
c) PORT 0 and PORT 2
d) PORT 1 and PORT 3

57. Which of the following registers are not bit addressable?

a) SCON
b) PCON
c) A
d) PSW

2. Combinational Logic and Sequential logic Circuit

Position in Question Paper **Total Marks-12**

Q.1. d) 2-Marks.
Q.3. b) 4-Marks.
Q.5. b) 6-Marks.

Descriptive Question

1) Explain ANL instruction using following addressing modes:
   a) Direct Addressing Mode
   b) Immediate Addressing Mode
   c) Indirect Addressing Mode
   d) Register addressing mode
2) Explain functioning of following instructions:
   a) DAA
   b) DJNZ R7, L1
   c) CJNE <destination byte>,<source byte>, rel
   d) Movc A,@ A+DPTR
3) Explain assembler directives.
4) Explain software development tools
5) Write an ALP to transfer 5 data bytes from memory location 40H to 50H.
6) Write an ALP to find count of even numbers from array of 10 data bytes which are stored from memory location 50H.
7) Suppose two data bytes are stored in location 3000H & 3001H, perform multiplication & store LSB of result in 3002H and MSB of result in 3003H.
8) Two numbers are stored in registers R1 & R2, perform addition and assume result is geater than 8 bit. Store the LSB of result in R2 and MSB of result in R3.

MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold**

1. When we add two numbers the destination address must always be.
   a) some immediate data
   c) accumulator
   b) any register
   d) memory
2. DAA command adds 6 to the nibble if:
   a) CY and AC are necessarily 1
   c) no relation with CY or AC
   b) either CY or AC is 1
   d) CY is 1

3. If SUBB A,R4 is executed, then actually what operation is being applied?
   a) R4+A
   c) A-R4
   b) R4-A
   d) R4+A
4. A valid division instruction always makes:
   a) CY=0,AC=1
   c) CY=0,AC=0
   b) CY=1,AC=1
   d) no relation with AC and CY
5. In 8 bit signed number operations, OV flag is set to 1 if:
   a) a carry is generated from D7 bit
   b) a carry is generated from D3 bit
   c) a carry is generated from D7 or D3 bit
   d) a carry is generated from D7 or D6 bit
6. In unsigned number addition, the status of which bit is important?
   a) OV
   c) AC
   b) CY
   d) PSW
7. Which instructions have no effect on the flags of PSW?
   a) ANL
   c) XRL
   b) ORL
   d) All of the mentioned
8. ANL instruction is used _____
   a) to AND the contents of the two registers
   b) to mask the status of the bits
   c) all of the mentioned
   d) none of the mentioned
9. CJNE instruction makes _____
   a) the pointer to jump if the values of the destination and the source address are equal
   b) sets CY=1, if the contents of the destination register are greater then that of the source register
   c) sets CY=0, if the contents of the destination register are smaller then that of the source register
   d) none of the mentioned
10 XRL, ORL, ANL commands have _____
   a) accumulator as the destination address and any register, memory or any immediate data as the source address
   b) accumulator as the destination address and any immediate data as the source address
   c) any register as the destination address and accumulator, memory or any immediate data as the source address
   d) any register as the destination address and any immediate data as the source address
11. "DJNZ R0, label" is _____ byte instruction.
   a) 2
   c) 1
   b) 3
   d) Can't be determined
12. JZ, JNZ, instructions checked content of _____ register.
   a) DPTR
   c) A
   b) B
   d) PSW
13. Calculate the jump code for again and here if code starts at 0000H

```
MOV R1,#0
MOV A,#0
MOV R0,#25H
AGAIN:ADD A,#0ECH
JNC HERE
HERE: INC R1
DJNZ R0,AGAIN
MOV R0,A
END
```

a) F3,02
c) E9,01
b) F9,01
d) E3,02

14. When the call instruction is executed the topmost element of stack comes out to be
a) the address where stack pointer starts
b) the address next to the call instruction
c) address of the call instruction
d) next address of the stack pointer

15. LCALL instruction takes
a) 2 bytes
c) 3 bytes
b) 4 bytes
d) 1 byte

16. Are PUSH and POP instructions are a type of CALL instructions?
a) yes
c) none of the mentioned
b) no
d) cant be determined

17. What is the time taken by one machine cycle if crystal frequency is 20MHz?
a) 1.085 micro seconds
c) 0.75 micro seconds
b) 0.60 micro seconds
d) 1 micro seconds

18. Find the number of times the following loop will be executed

```
MOV R6,#200
BACK:MOV R5,#100
HERE:DJNZ R5, HERE
DJNZ R6,BACK
END
```

a) 100
c) 20000
b) 200
d) 2000

19. What is the meaning of the instruction MOV A,05H?
a) data 05H is stored in the accumulator
b) fifth bit of accumulator is set to one
c) address 05H is stored in the accumulator
d) none of the mentioned

20.Do the two instructions mean the same?

```
1) BACK:  DEC R0
          JZ BACK
2) BACK:  DJNZ RO, BACK
```

a) yes
b) no

c) can't be determined
d) yes and the second one is preferred

21. Is this a valid statement?
SETB A
a) yes
c) can't be determined
b) no
d) none of the mentioned

22.Which of the following comes under the indexed addressing mode?
a) MOVX A, @DPTR
c) MOV A,R0
b) MOVC @A+DPTR,A
d) MOV @R0,A

23. Which instruction is used to check the status of a single bit?
a) MOV A,P0
c) JNB PO.0, label
b) ADD A,#05H
d) CLR P0.05H

24.Which operator is the most important while assigning any instruction as register indirect instruction?
a) $
c) @
b) #
d) &

25.What is the advantage of register indirect addressing mode?
a) it makes use of registers R0 and R1
c) it makes use of operator @
b) it uses the data dynamically
d) it is easy

26.In which of these modes, the immediate operand is included in the instruction itself?
a) register operand mode
b) immediate operand mode
c) register and immediate operand mode
d) none of the mentioned

27. In register address mode, the operand is stored in
a) 8-bit general purpose register
c) si or di
b) 16-bit general purpose register
d) all of the mentioned

28. In which of the following addressing mode, the offset is obtained by adding displacement and contents of one of the base registers?
a) direct mode
c) based mode
b) register mode
d) indexed mode

29. The address of a location of the operand is calculated by adding the contents of any of the base registers, with the contents of any of index registers in
a) based indexed mode with displacement
b) based indexed mode
c) based mode
d) indexed mod

30. The representation of 8-bit or 16-bit signed binary operands using 2's complement is a data type of
a) Ordinal
c) Packed BCD
b) ASCII
d) integer

31. While executing the PUSH*A instruction, the stack pointer is decremented by
a) 1 bit
c) 4 bits
b) 2 bits
d) 16 bits

32. The instruction that multiplies the content of AL with a signed immediate operand is
a) MUL
c) IMUL
b) SMUL
d) None of the mentioned

33. The instruction that represents the 'rotate source, count' is
a) RCL
c) ROR
b) RCR
d) All of the mentioned

34. Which of the following is not an instruction of 8051 instructions?
a) arithmetic instructions
c) logical instructions
b) boolean instructions
d) none

35. The operations performed by data transfer instructions are on
a) bit data
c) 16-bit data
b) byte data
d) all of the mentioned

36. The logical instruction that affects the carry flag during its execution is
a) XRL A;
c) ORL A;
b) ANL A;
d) RLC A;

37. The instruction that is used to complement or invert the bit of a bit addressable SFR is
a) CLR C
c) CPL Bit
b) CPL C
d) ANL Bit

38. All conditional jumps are
a) absolute jumps
c) short jumps
b) long jumps
d) none

39. In logical instructions, the immediate data can be an operand for
a) increment operation
c) single operand instruction
b) decrement operation
d) none

40. The first byte of a short jump instruction represents
a) opcode byte
c) opcode field
b) relative address
d) none

3. Microprocessor and 8051 Microcontroller

Position in Question Paper **Total Marks-16**

Q.1. c) 2-Marks.
Q.2. d) 4-Marks.
Q.5. c) 6-Marks.
Q.6. b) 4-Marks

Descriptive Question

1) Explain format of TMOD register.
2) Explain TCON register
3) Explain modes of timer in 8051.
4) Explain IE register.
5) Describe Interrupts in 8051.
6) Explain modes in serial communication.
7) Explain format of SCON register.
8) Write an ALP to generate 5kHz square wave on P1.0
9) Write an ALP to send "MSBTE" on serial port p0.1 of 8051 at 4800 baudrate.
10) Write an ALP to send data from P0 to P2 if P1.7 is high.

MCQ Question

(Total number of Question=Marks*3=16*3=48)

Note: Correct answer is marked with **bold**

1. Which devices are specifically being used for converting serial to parallel and from parallel to serial respectively?
   a) timers
   c) registers
   b) counters
   d) serial communication
2. What is the difference between UART and USART communication?
   a) they are the names of the same particular thing, just the difference of A and S is there in it
   b) one uses asynchronous means of communication and the other uses synchronous means of communication
   c) one uses asynchronous means of communication and the other uses asynchronous and synchronous means of communication
   d) one uses angular means of the communication and the other uses linear means of communication

3. Which of the following best describes the use of framing in asynchronous means of communication?
   a) it binds the data properly
   b) it tells us about the start and stops of the data to be transmitted or received
   c) it is used for error checking
   d) it is used for flow control
4. Which of the following signal control the flow of data?
   a) RTS
   b) DTR
   c) RTS & DTR
   d) None of the mentioned
5. Which of the following is the logic level understood by the micro-controller/micro-processor?
   a) TTL logic level
   b) RS232 logic level
   c) None of the mentioned
   d) TTL & RS232 logic level
6. What is a null modem connection?
   a) no data transmission
   b) no MAX232
   c) the RxD of one is the TxD for the other
   d) no serial communication
7. Which of the following best states the reason that why baud rate is mentioned in serial communication?
   a) to know about the no of bits being transmitted per second
   b) to make the two devices compatible with each other, so that the transmission becomes easy and error free
   c) to use Timer 1
   d) for wasting memory
8. With what frequency UART operates(where f denoted the crystal frequency)?
   a) f/12
   b) f/32
   c) f/144
   d) f/384
9. What is the function of the SCON register?
   a) to control SBUF and SMOD registers
   b) to program the start bit, stop bit, and data bits of framing
   c) to control SMOD registers
   d) none of the mentioned
10. What should be done if we want to double the baud rate?
   a) change a bit of the TMOD register
   b) change a bit of the PCON register
   c) change a bit of the SCON register
   d) change a bit of the SBUF register
11. What is the clock source for the timers?
   a) some external crystal applied to the micro-controller for executing the timer
   b) from the crystal applied to the micro-controller
   c) through the software
   d) through programming.
12. What is the frequency of the clock that is being used as the clock source for the timer?

a) some externally applied frequency f'
c) controller's crystal frequency /12
b) controller's crystal frequency f
d) externally applied frequency/12

13What is the function of the TMOD register?

a) TMOD register is used to set various operation modes of timer/counter
b) TMOD register is used to load the count of the timer
c) Is the destination or the final register where the result is obtained after the operation of the timer
d) Is used to interrupt the timer

14. What is the maximum delay that can be generated with the crystal frequency of 22MHz?

a) 2978.9 sec
c) 11.63 sec
b) 0.011 msec
d) 2.97 msec

15. Auto reload mode is allowed in which mode of the timer?

a) Mode 0
c) Mode 2
b) Mode 1
d) Mode 3

16. Find out the roll over value for the timer in Mode 0, Mode 1 and Mode 2?

a) 00FFH,0FFFH,FFFFH
c) 1FFFH,FFFFH,00FFH
b) 1FFFH,0FFFH,FFFFH
d) 1FFFH,00FFH,FFFFH

17. What steps are followed when we need to turn on any timer?

a) load the count, start the timer, keep monitoring it, stop the timer
b) load the TMOD register, load the count, start the timer, keep monitoring it, stop the timer
c) load the TMOD register, start the timer, load the count, keep monitoring it, stop the timer
d) none of the mentioned

18. If Timer 0 is to be used as a counter, then at what particular pin clock pulse need to be applied?

a) P3.3
c) P3.5
b) P3.4
d) P3.6

19.In the instruction "MOV TH1,#-3", what is the value that is being loaded in the TH1 register?

a) 0xFCH
c) 0xFDH
b) 0xFBH
d) 0xFEH

20. TF1, TR1, TF0, TR0 bits are of which register?

a) TMOD
c) TCON
b) SCON
d) SMOD

21. Which devices are specifically being used for converting serial to parallel and from parallel to serial respectively?

a) timers
c) registers
b) counters
d) serial communication

22. Which of the following best describes the use of framing in asynchronous means of communication?

a) it binds the data properly
b) it tells us about the start and stops of the data to be transmitted or received
c) it is used for error checking
d) it is used for flow control

23. What is the difference between UART and USART communication?
a) they are the names of the same particular thing, just the difference of A and S is there in it
b) one uses asynchronous means of communication and the other uses synchronous means of communication
c) one uses asynchronous means of communication and the other uses asynchronous and synchronous means of communication
d) one uses angular means of the communication and the other uses linear means of communication

24. Which of the following signal control the flow of data?
a) RTS
b) DTR
c) RTS & DTR
d) None of the mentioned

25. Which of the following is the logic level understood by the micro-controller/micro-processor?
a) TTL logic level
b) RS232 logic level
c) None of the mentioned
d) TTL & RS232 logic level

26. What is a null modem connection?
a) no data transmission
b) no MAX232
c) the RxD of one is the TxD for the other
d) no serial communication

27. What is the function of the SCON register?
a) to control SBUF and SMOD registers
b) to program the start bit, stop bit, and data bits of framing
c) to control SMOD registers
d) none of the mentioned

28. What should be done if we want to double the baud rate?
a) change a bit of the TMOD register
b) change a bit of the PCON register
c) change a bit of the SCON register
d) change a bit of the SBUF register

29. When an interrupt is enabled, then where does the pointer moves immediately after this interrupt has occurred?
a) to the next instruction which is to be executed
b) to the first instruction of ISR
c) to a fixed location in memory called interrupt vector table
d) to the end of the program

30. What are the contents of the IE register, when the interrupt of the memory location 0x00 is caused?
a) 0xFFH
b) 0x00H
c) 0x10H
d) 0xF0H

31. After RETI instruction is executed then the pointer will move to which location in the program?
a) next interrupt of the interrupt vector table
b) immediate next instruction where interrupt is occurred
c) next instruction after the RETI in the memory
d) none of the mentioned

32. Which pin of the external hardware is said to exhibit INT0 interrupt?
a) pin no 10
b) pin no 11
c) pin no 12
d) pin no 13

33. Which bit of the IE register is used to enable TxD/RxD interrupt?
a) IE.D5
b) IE.D2
c) IE.D3
d) IE.D4

34.Which of the following combination is the best to enable the external hardware interrupt 0 of the IE register (assuming initially all bits of the IE register are zero)?
a) EX0=1
b) EA=1
c) any of the mentioned
d) EX0=1 & EA=1

35. Why normally LJMP instructions are the topmost lines of the ISR?
a) so as to jump to some other location where there is a wider space of memory available to write the codes
b) so as to avoid overwriting of other interrupt instructions
c) all of the mentioned
d) none of the mentioned

36. Which register is used to make the interrupt level or an edge triggered pulse?
a) TCON
b) IE
c) IPR
d) SCON

37. What is the disadvantage of a level triggered pulse?
a) a constant pulse is to be maintained for a greater span of time
b) another interrupt may be generated if the low-level signal is not removed before the ISR is finished
c) it is difficult to produce
d) another interrupt may be caused if the signal is still low before the completion of the last instruction

38. What is the correct order of priority that is set after a controller gets reset?
a) RI/TI > TF1 > TF0 > INT1 > INT0
b) RI/TI < TF1 < TF0 < INT1 < INT0
c) INT0 > TF0 > INT1 > TF1 >RI/TI
d) INT0 < TF0 < INT1 < TF1 < RI/TI

39.What is the bit transmitting or receiving capability of mode 1 in serial communication?
a) 8 bits
b) 10 bits
c) 11 bits
d) 12 bits

40.Which pin in the shift register mode (Mode 0) of serial communication allow the data transmission as well as reception ?
a) TXD
b) RXD
c) RB8
d) REN

41.Which bit must be set in TCON register in order to start the 'Timer 0' while operating in 'Mode 0'?

a) TR0
c) IT0
b) TF0
d) IE0

42.Who controls the timer1 especially when it is configured as a timer in mode'0',where gate and TR1 bits are attributed to be '1" in TMOD register ?

a) TR1
c) TF1
b) External input at (INT1)
d) All of the above

43.Which timer mode exhibit the necessity to generate the interrupt by setting EA bit in IE enhancing the program counter to jump to another vector location ?

a) Mode 0
c) Mode 2
b) Mode 1
d) Mode 3

44.Why is it not necessary to specify the baud rate to be equal to the number of bits per second ?

a) Because each bit is preceded by a start bit & followed by one stop bit
b) Because each byte is preceded by a start byte & followed by one stop byte
c) Because each byte is preceded by a start bit & followed by one stop bit
d) Because each bit is preceded by a start byte &followed by one stop byte

45.Which factor/s is/are supposed to have the equal values at both phases of transmission and reception levels with an intimation of error-free serial communication?

a) Baud Rate
c) Status of Parity bits
b) Number of data bits & stop bits
d) All of the above

46.Which bits exhibit and signify the termination phase of the character transmission and reception in SCON special function register?

a) Control bits
c) Both a & b
b) Status bits
d)None of the above

47.Which two bits are supposed to be analyzed / tested for unity value (1) in SCON for the reception of byte in mode 1 serial communication?

a) RI & TI
c) RI & REN
b) REN & RB8
d) TI & RB8

48.What is the bit transmitting or receiving capability of mode 1 in serial communication?

a) 8 bits
c) 11 bits
b) 10 bits
d) 12 bits

4. 8051 Instruction set and Programming

Position in Question Paper **Total Marks-12**

Q.3.d) 4-Marks.
Q.4.c) 4-Marks
Q.6.a) 4Marks

Descriptive Question

1) Draw interfacing diagram of 4K*8 RAM with 8051.
2) Draw the interfacing diagram of 8 LED's connected to port0, also write an ALP to toggle LED's after 1mS. Delay.
3) Draw the interfacing diagram of & segment display to 8051.
4) Write a program to display "WELCOME" on LCD.
5) Draw interfacing diagram of Relay with 8051.
6) Draw interfacing diagram of stepper motor with 8051 and write a program to rotate motor in clockwise direction.
7) Draw the diagram of DAC interfacing with 8051 and write a program to generate staircase waveform.
8) Draw interfacing diagram of ADC with 8051.

MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold**

1. Which of the following is not one of the SFR addresses of the ports of 8051?
   a) 80H
   b) 90H
   c) A0H
   d) NONE
2. Each port line of a port can individually source a current of upto
   a) 0.2 mA
   c) 0.5 mA
   b) 0.25 mA
   d) 0.75 mA
3. Each port line of a port can individually sink a current of upto
   a) 2 mA
   c) 5 mA
   b) 8 mA
   d) 1 mA
4. The number of TTL inputs that can be sinked by the port 0 when a logic 0 is sent to a port line as an output port is
   a) 2
   c) 6
   b) 4
   d) 8
5. The open drain bidirectional (input or output) port with internal pullups is

a) Port 0
c) Port 2
b) Port 1
d) Port 3

6.Which data memory control and handle the operation of several peripherals by assigning them in the category of special function registers?

a) Internal on-chip RAM
c) Both a & b
b) External off-chip RAM
d) None of the above

7.Why is the speed accessibility of external data memory slower than internal on-chip RAM?

a) Due to multiplexing of lower order byte of address-data bus
b) Due to multiplexing of higher order byte of address-data bus
c) Due to demultiplexing of lower order byte of address-data bus
d) Due to demultiplexing of higher order byte of address-data bus

8. If the EA(active low) signal is grounded then the execution

a) directly start from main memory
b) directly start from 16 bit address in main memory
c) directly start from 16 bit address in program memory
d) directly start from RAM

9. When the port lines of a port are to be used as input lines then the value that must be written to the port address is

a) F0H
c) FFH
b) 0FH
d) 00H

10. The configuration in which each LED receives operating current of 8 mA from power supply while the port lines sink the current on each port line is

a) common port configuration
c) common cathode configuration
b) common anode configuration
d) none of the mentioned

11. Port 1 lines are used during programming of

a) external EPROM and EEPROM
c) internal ROM and RAM
b) external ROM and RAM
d) internal EPROM and EEPROM

12.What is the possible range of current limiting resistor essential for lightening the LED in certain applications after pressing the push-button?

a) 25- 55 Ω
c) 110-220 Ω
b) 55-110 Ω
d) 220- 330 Ω

13.What is/are the consequences of driving the LED in the form of an output function?

a) Pin sources the current when made low without glowing LED
b) Pin sinks the current when made high without glowing LED
c) Pin sources the current when made high by glowing LED
d) Pin sinks the current when made low by glowing LED

14. If EA(active low) signal =1, then the execution starts from

a) internal EPROM
c) internal EPROM or flash RAM
b) flash RAM
d) none

15. The pin that is grounded for interfacing external EPROM is

a) EA(active low)
c) OE(active low)
b) PSEN(active low)
d) All of the mentioned

16. The step that is involved in the procedure of memory interfacing with 8051 is
a) data bus is connected to data lines of memory chips
b) PSEN(active low) is connected to OE(active low) of EPROM chips
c) writing address map of memory chip in bit form
d) all of the mentioned

17. The device that is used for deriving chip select signals is
a) Logic gates
b) Multiplexers
c) PLAs and EPROMs
d) All of the mentioned

18. For deriving chip selects of isolated memory or IO devices, the gates that are traditionally used are
a) NOR and NAND
b) NAND and NOT
c) NOT and NOR
d) AND, OR and NOT

19. The current that is required for a LED for an appropriate glow is
a) 6-8 mA
b) 4-6 mA
c) 8-10 mA
d) 10-12 mA

20. The maximum current that can be sinked totally by all the ports of 8051 is
a) 61 mA
b) 81 mA
c) 91 mA
d) 71 mA

21. The number of LEDs that can be connected to a port of 8051, if all are expected to glow simultaneously is
a) 6
b) 8
c) 10
d) 12

22 .Which is true in interfacing 7 segment code display?
a) transmitted by second port
b) display is selected by third port
c) display is selected by second port
d) none of the mentioned

23. After the display is selected by second port, then the digit (LED) glows for a duration of
a) 5 msec
b) 10 msec
c) 2 msec
d) 6 msec

24. To convert its current output into a voltage, the DAC 0808 is connected with
a) Transistor(BJT) externally
b) FET externally
c) OPAMP externally
d) OPAMP internally

25. While programming the ADC0808/0809 IC what steps are followed?
a) select the analog channel, start the conversion, monitor the conversion, display the digital results
b) select the analog channel, activate the ALE signal (L to H pulse), start the conversion, monitor the conversion, read the digital results
c) select the analog channel, activate the ALE signal (H to L pulse), start the conversion, monitor the conversion, read the digital results
d) select the channel, start the conversion, end the conversion

26. In ADC0808/0809 IC which pin is used to select Step Size?

a) Vref
c) Vref/2 & Vin
b) Vin
d) None of the mentioned

27. Which of the following statements are true about DAC0808?

a) parallel digital data to analog data conversion
b) it has current as an output
c) all of the mentioned
d) none of the mentioned

28. 8 input DAC has _____

a) 8 discrete voltage levels
c) 124 discrete voltage levels
b) 64 discrete voltage levels
d) 256 discrete voltage levels

29. Which of the following steps detects the key in a 4*4 keyboard matrix about the key that is being pressed?

a) masking of bits
b) ensuring that initially, all keys are open
c) checking that whether the key is actually pressed or not
d) all of the mentioned

30. What is described by this command: CJNE A,#00001111b, ROW1

a) it masks the bit and then jumps to the label where ROW1 is written
b) it makes the value of the accumulator 0FH and then jumps at the address where ROW1 label is written
c) it compares the value of the accumulator with 0FH and jumps to the location where ROW1 label is there if the value becomes equal
d) it compares the value of the accumulator with 0FH and jumps to the location where ROW1 label is there if the value is not equal

31. To detect that in which column, the key is placed?

a) we can mask the bits and then check it
b) we can rotate the bits and then check that particular bit which is set or reset(according to the particular condition)
c) none of the mentioned
d) all of the mentioned

32. In reading the columns of a matrix, if no key is pressed we should get all in binary notation

a) 0
c) F
b) 1
d) 7

33. If we need to operate a key of a keyboard in an interrupt mode, then it will generate what kind of interrupt?

a) ES
c) T0/T1
b) EX0/EX1
d) RESET

34. To identify that which key is being pressed, we need to:

a) ground all the pins of the port at a time
b) ground pins of the port one at a time
c) connect all the pins of the port to the main supply at a time
d) none of the mentioned

35. Key press detection and Key identification are:
a) the same processes
b) two different works are done in Keyboard Interfacing
c) none of the mentioned
d) any of the mentioned

36. How many rows and columns are present in a 16*2 alphanumeric LCD?
a) rows=2, columns=32
b) rows=16, columns=2
c) rows=16, columns=16
d) rows=2, columns=16

37. How many data lines are there in a 16*2 alphanumeric LCD?
a) 16
b) 8
c) 1
d) 0

38. Which pin of the LCD is used for adjusting its contrast?
a) pin no 1
b) pin no 2
c) pin no 3
d) pin no 4

39. Which command of an LCD is used to shift the entire display to the right?
a) 0x1C
b) 0x18
c) 0x05
d) 0x07

40. Which of the following step/s is/are correct for sending data to an LCD?
a) set the R/W bit
b) set the E bit
c) set the RS bit
d) all of the mentioned

41. Which instruction is used to select the first row first column of an LCD?
a) 0x08
b) 0x0c
c) 0x80
d) 0xc0

42. What are DPDT relays?
a) Single pole, single throw
b) Single pole, double throw
c) Double pole, double throw
d) None of the mentioned

43. Why do we need a ULN2803 in driving a relay?
a) for switching a motor
b) for increasing the current
c) for increasing the power
d) for switching the voltage

44. How can we control the speed of a stepper motor?
a) by controlling its switching rate/by changing length of delay loop
b) by controlling its torque
c) by controlling its wave drive 4 step sequence
d) cant be controlled

5. 8051 Memory, I/O Device Interfacing and Application

Position in Question Paper **Total Marks-18**

Q.6. b) 6-Marks

Q.5. c) 6-Marks

Descriptive Question

1) Write an ALP to generate square wave on pin P 1.5 of 1kHz using timer in auto reload mode
2) Explain water level controller.
3) Explain Temperature controller.
4) Explain Traffic Light Controller.
5) Write an ALP to generate a square wave with 75% duty cycle on p2.3
6) Write an ALP to generate triangular wave on P0.5 using DAC.

MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold**

1. Which LCD display is present in LPC 2148 Development Board?
   a) 8*8 LED
   b) 2*32 LCD
   c) 2*16 LCD connected peripherally
   d) 2*16 LCD on-chip
2. The USB controller provides high speed interface to laptop/PC with a speed of _____
   a) On-chip USB with 12Mb/s
   b) On-chip USB with 15Mb/s
   c) Peripheral USB with 12Mb/s
   d) Peripheral USB with 15Mb/s
3. A thermistor is a _____
   a) sensor
   b) adc
   c) transducer
   d) micro controller
4. What is the difference between LM 34 and LM 35 sensors?
   a) one is a sensor and the other is a transducer
   b) one's output voltage corresponds to the Fahrenheit temperature and the other corresponds to the Celsius temperature
   c) one is of low precision and the other is of higher precision
   d) one requires external calibration and the other doesn't require it
5. An electronic device which converts physical quantity or energy from one form to another is called _____
   a) Sensor
   b) Transistor
   c) Transducer
   d) Thyristor

6. What is signal conditioning?
   a) to analyse any signal
   b) conversion or modification is referred to as conditioning
   c) conversion from analog to digital is signal conditioning
   d) conversion from digital to analog is signal conditioning
7. What steps have to be followed for interfacing a sensor to a microcontroller 8051?
   a) make the appropriate connections with the controller, ADC conversion, analyse the results
   b) interface sensor with ADC and ADC with 8051
   c) interface sensor with the MAX232, send now to microcontroller, analyse the results
   d) none of the mentioned
8. LM35 has how many pins?
   a) 2 **c) 3**
   b) 1 d) 4
9. Why Vref is set of ADC0848 to 2.56 V if analog input is connected to the LM35?
   a) to set the step size of the sampled input
   b) to set the ground for the chip
   c) to provide supply to the chip
   d) all of the mentioned
10. Which of the following is correct about the word sensors?
    a) that senses something
    b) it is a type of a transducer that converts one form of energy to another
    c) it can produce output in the form of electrical pulses, current or voltage
    d) all of the mentioned
11. Why do we need to apply the concept of signal conditioning to a sensor?
    a) in order to convert it into a desirable form of energy
    b) for testing
    c) for sensing something
    d) all of the mentioned
12. Which of the following is correct about LM35 based sensors?
    a) its output voltage is directly proportional to the Celsius scale
    b) its output voltage is directly proportional to the Fahrenheit scale
    c) none of the mentioned
    d) all of the mentioned
13. What is the difference between the LM34 and the LM35 based sensors?
    a) one requires external calibration while other does not
    b) one has output voltage proportional to the Celsius scale while others have to the Fahrenheit scale
    c) one is fast other is slow
    d) all of the mentioned
14. Every transducer must be connected with the signal conditioning circuit?
    a) true c) can't say
    b) false d) depends on the conditions

15. LM35 provides _____ V for each degree count?
a) 1
b) 0.1
c) 0.001
d) 10

16. Why for the 8 bit analog input we select Vref as the 2.56V?
a) to obtain each degree count as the 2.56V
b) to get 2.56V at the output
c) to obtain each degree count as the 10mV
d) to get 10mV as the output

17. What is the temperature for LM35 sensor if the analog output is 0011 1001?
a) 3
b) 9
c) 57
d) 41

18. In an external hardware, there are how many pins available for the LM35 and the LM34 based sensors?
a) 2
b) 3
c) 10
d) 1

19. Do LM34 and LM35 based sensors have linear output?
a) yes
b) no
c) depends on the conditions
d) can't say

20. The 8255 is a _____ chip.
a) Input/Output
b) Analog to Digital
c) Digital to analog
d) None of the mentioned

21. Which pins are used to select the ports and the control register?
a) CS
b) A1
c) A0
d) All of the mentioned

22. Find the control word for PA = out, PB = in, PCL = out, PCH = out (Mode0)?
a) 0x02H
b) 0x82H
c) 0x83H
d) 0x03H

23. What is the value of the control register when RESET button is set to zero?
a) 0x00H
b) 0xFFH
c) 0x11H
d) value remains the same

24. Why MOVX instruction is being used to access the ports of the 8255?
a) because 8255 is connecting a microcontroller in memory mapped I/O configuration
b) because 8255 is used to access the external communication
c) because 8255 is used to access the data transfer
d) because 8255 is used to access the interfacing of LCD, motor etc

25. How many pins of the 8255 can be used as the I/O ports?
a) 8
b) 16
c) 24
d) 32

26. In which of these modes, the immediate operand is included in the instruction itself?
a) register operand mode
b) immediate operand mode

c) register and immediate operand mode
d) none of the mentioned

27. In register address mode, the operand is stored in
a) 8-bit general purpose register
b) 16-bit general purpose register
c) si or di
d) all of the mentioned

28. In which of the following addressing mode, the offset is obtained by adding displacement and contents of one of the base registers?
a) direct mode
c) based mode
b) register mode
d) indexed mode

29. The address of a location of the operand is calculated by adding the contents of any of the base registers, with the contents of any of index registers in
a) based indexed mode with displacement
b) based indexed mode
c) based mode
d) indexed mode

30. The representation of 8-bit or 16-bit signed binary operands using 2's complement is a data type of
a) Ordinal
b) ASCII
c) Packed BCD
d) integer

31. To detect that in which column, the key is placed?
a) we can mask the bits and then check it
b) we can rotate the bits and then check that particular bit which is set or reset(according to the particular condition)
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d) any of the mentioned

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b) rows=16, columns=2

c) rows=16, columns=16

d) rows=2, columns=1