IT-313 MINOR EXAM

Note : Only to the point & relevant answers or rational attempts in the absence of the preceding will fetch credit
Vague, nondescript and misleading work will be penalized
List proper units for all the results and determinants

Q1. An AM waveform has the form:

$$x(t) = 10[1 - 0.5\cos2000\pi t + 0.25\cos4000\pi t - 3.3\sin5000\pi t]\cos40000\pi t + 6.6 \text{ Volts}$$

I. Sketch its frequency spectrum
II. Calculate the depth of modulation impressed onto the carrier
III. Find total and SB power carried
IV. Find the BW(bandwidth) carried by this AM signal

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IT-305 COMPUTER ARCHITECTURE

Date of Exam 14-10-2020

Time : 1 hr   **Max Marks : 20**

1. A computer uses a memory unit with 64 K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 128 registers, and an address part.
a. How many distinct operation codes are possible?
b. What is bit size of PC, AR and IR ? **(2 marks)**

2. A digital computer has a memory unit with a capacity of 4K words , 32 bits per word. There no indirect mode bit. Two instructions are packed in one memory word and a 32-bit instruction register IR is available in the control unit. Draw the instruction format and formulate a procedure for fetching and executing instructions for this computer. **(3 marks)**

3. The instruction set of the basic computer is provided to you in Appendix of question paper. The block diagram is also provided . The initial content of AC in the basic computer is hexadecimal B298H and the initial value of E flip flop is 1 . The initial value of PC is hexadecimal 012. A programmer writes the following program and single steps through the program to examine the contents of AC, PC, IR, AR .
INC
CLE
CMA
CME
CIR
CLA
INC
CMA
CIL
SPA
INC
HLT
Draw a table to show the contents of AC, PC, IR, AR in Hexadecimal as seen by the programmer after execution of each instruction. **(4 marks)**

4. Write the symbolic program generated by an assembler using instruction set of basic computer given in appendix for the following high level language code fragment
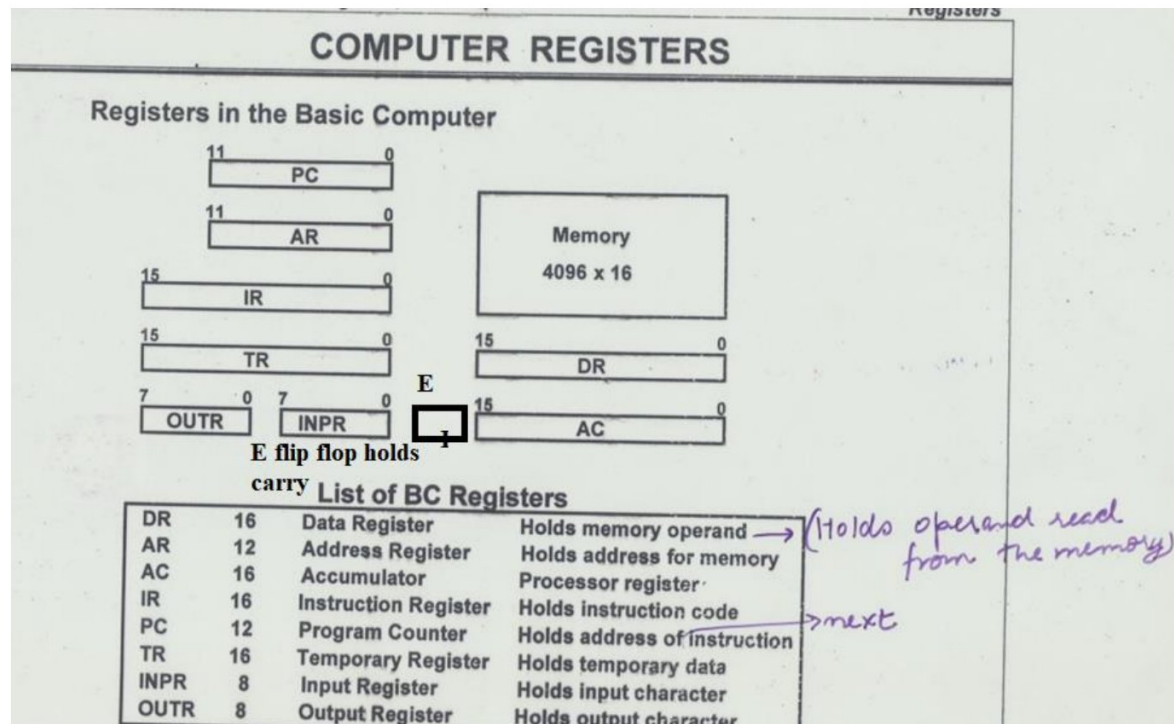
```
{ int i=1;
   int suma=0, sumb=0;
  while(i<=100)
{
   If (i%2==0)
       suma=suma+i;
else

       sumb=sumb+i;
} ( 5 marks)
```

5. An instruction is stored at location 400 with its address field at location 401 . The address field has the value 600. A processor register R1 contains the number 300. Evaluate the effective address if the addressing mode of the instruction is (a) direct; (b) immediate; (c) relative; (d) register indirect; (e) index with R1 as the index register. Put your solution in tabular form. (3 marks)

6.A computer has 32-bit instructions and 8-bit addresses. If there are 240 three-address instructions, how many two-address instructions can be formulated? Assume that there are no single address instructions. (2 marks)

7. A relative mode branch type of instruction is stored in memory at an address equivalent to decimal 650. The branch is made to an address equivalent to decimal 400. What should be the value of the relative address field of the instruction in hexadecimal? (1 marks)

Appendix

COMPUTER REGISTERS

Registers in the Basic Computer

E flip flop holds carry

List of BC Registers

DR	16	Data Register	Holds memory operand → (Holds operand read from the memory)
AR	12	Address Register	Holds address for memory
AC	16	Accumulator	Processor register
IR	16	Instruction Register	Holds instruction code
PC	12	Program Counter	Holds address of instruction → next
TR	16	Temporary Register	Holds temporary data
INPR	8	Input Register	Holds input character
OUTR	8	Output Register	Holds output character

BASIC COMPUTER INSTRUCTIONS

Symbol	Hex Code I = 0	Hex Code I = 1	Description
AND	0xxx	8xxx	AND memory word to AC
ADD	1xxx	9xxx	Add memory word to AC
LDA	2xxx	Axxx	Load AC from memory
STA	3xxx	Bxxx	Store content of AC into memory
BUN	4xxx	Cxxx	Branch unconditionally
BSA	5xxx	Dxxx	Branch and save return address
ISZ	6xxx	Exxx	Increment and skip if zero
CLA	7800		Clear AC
CLE	7400		Clear E
CMA	7200		Complement AC
CME	7100		Complement E
CIR	7080		Circulate right AC and E
CIL	7040		Circulate left AC and E
INC	7020		Increment AC
SPA	7010		Skip next instr. if AC is positive
SNA	7008		Skip next instr. if AC is negative
SZA	7004		Skip next instr. if AC is zero
SZE	7002		Skip next instr. if E is zero
HLT	7001		Halt computer
INP	F800		Input character to AC
OUT	F400		Output character from AC
SKI	F200		Skip on input flag
SKO	F100		Skip on output flag
ION	F080		Interrupt on
IOF	F040		Interrupt off

Total marks:15   Subject: IT-313, Communication system   Maximum time :1 Hour

Q.1 Draw block diagram of digital communication and explain all basic elements of it in brief.

Q.2 Write all 12 properties of Fourier transform.

Q.3 Explain analog modulation and its type.

Q.4 $x(t)=Acos(w_0t)$ then find a) Autocorrelation b) Power Spectral density, c) power

Q.5 A continuous random variable X uniformly distributed in the interval (-10,10) with magnitude 0.05 find all of its statistical average (mean, mean square value ,Variance, standard deviation).