Indirect Addressing -

Using H-L registers & using M pointer

Indirect Addressing + Jump.

→ Compare

CMP n (registers)

CPI 8 bit value (x)

A < n ← CY = 1
A = n ← Z = 1
A > n ← CY = 0 & Z = 0.

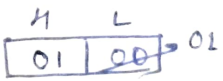
A < x
A = x
A > x
"

Prob 13 : Comparison of two bytes for equality. The bytes are available in 0X0100 & 0X0101. If they are equal, store same value in 0X0102, else store '00' in 0X0102.
Use Indirect Addressing.

Soln :

1. Load H-L with 0X0100
2. Move it to A
3. Increment H-L
4. Compare A with M.
5. If Z = 1, store the no. in Acc into 0X0102.
6. else store '00' in 0X0102.

```
LXI     H, 0X0100
MOV     A, M
INX     H
```



```
CMP     M
JZ      EQUAL
MVI     A,00
INX     H
MOV     M,A
HLT
```

replace by → (1) `XRA A`

↳ this will affect flag so check.

(2) → If not then also the same code. The next part EQUAL: will be executed sequentially.

```
EQUAL: INX  H
       MOV  M,A
       HLT
```

→ If otherway round,

```
JNZ     NEQ
INX     H
MOV     M,A
HLT
```

→ replace by

```
JNZ     NEQ
JMP     CONTINUE
```

```
NEQ:      MVI  A,0X00
CONTINUE: INX  H
          MOV  M,A
          HLT
```

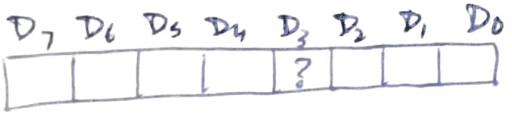
→ If any situation you need to use a conditional jump followed by a jump then you may reverse it and can make the program by a single conditional jump.

Prob 14 : Testing bit D_3 of a byte. A byte is available in 0X0100. Test its D_3 bit,

If $D_3 = 0$, store $\phi\phi$ in 0X0101

else , store 'FF' in 0X0101

Use indirect addressing.



Soln :

1. Load H-L with 0X0100.
2. Bring it to A.
3. ANDING with 0X08
4. If Z = 1, store zero
   else, store 'FF' in 0X0101

```
        LXI   H, 0X0100
        MOV   A, M
        ANI   0X08
        JZ    ZERO
        MVI   A, 0XFF
        INX   H
        MOV   M, A
        HLT
ZERO :  MVI   A, 0X00
        INX   H
        MOV   M, A
        HLT
```

```
        JNZ   NOZ
        MVI   A, 0XDD
        INX   H
        MOV   M, A
        HLT
NOZ :   MVI   A, 0XFF
        INX   H
        MOV   M, A
        HLT
```

```
        LXI     H, 0X0100
        MOV     A, M
        ANI     0X08
        JZ      ZERO
        MVI     A, 0XFF
STORE:  INX     H
        MOV     M, A
        HLT
ZERO:   MVI     A, 00
        JMP     STORE
```

1#	0	21	00	01
2#	3	7E		
3#	4	E6	08	
4#	6	CA	ZERO ?	
5#	9	3E	FF	
6#	B	23		
7#	C	77		
8#	D	76		
9#	E	3E	00	
10#	10	C3	0B	

label table

ZERO	~~????~~ → 000E
STORE	000B

→ Two pass assemblers, so that every label is identified.

→ Forward referencing: Use it first then define the labels. This requires two passes.

→ Backward referencing: Define it first & used it later.

Prob 15 : Addition of 2 bit no's having around 4 carry bytes 0x0100 0x0101

Result 0x0102 (sum) 0x0102 (carry)

Sol":

DA

```
LDA     0X0100
MOV     B, A
LDA     0X0101
ADD     B
STA     0X0102
MVI     A, 00
JNC     STORE1
MVI     A, 0X01
STORE : STA  0X0103
        HLT
STORE1: MVI  A, 0X01
        STA  0X0103
        HLT
```

```
STA     0X0102
MVI     A, 00
JNC     STORE
MVI     A, 0X01
STORE : STA  0X0103
        HLT
```

→ categories for some codes:

1) Subroutines
2) Stack
3) I/O → Input / Output

Prob 16 : A group of N bytes are stored in 0X0101 onwards the value of N is available in 0X0100. Add them neglecting the carry generated at each stage and store the result in 0X0200.

1. Move N (0x0100) → C
2. Clear accumulator (MVI A,00 / XRA A)
3. Start from 0x0101 & Add M to A
4. DCR C
5. If Z not set, repeat from step 3 else store the result

Soln

```
      LXI   H, 0X0100
      MOV   C, M
      XRA   A
AGAIN: INX  H
      ADD   M
      DCR   C
      JNZ   AGAIN
      STA   0X0200
AGAIN: HLT
```

Prob 17 A group of N bytes are stored in 0x0101 onwards. The value of N is available in 0x0100. Add them taking into account carry, generated at each stage & store the result in 0x0200 – 0x0201
(0x0200 ↓ sum, 0x0201 ↓ carry)

Soln

```
      LXI   H, 0X0100
      MOV   C, M
      XRA   A
      MOV   B, A
AGAIN: INX  H
      ADD   M
```

```
        JC      CARRY
CONTINUE: DCR   C
        JNZ     AGAIN
        STA     0X0200
        MOV     A, B
        STA     0X0201
        HLT
CARRY :  INR    B
        JMP     CONTINUE
```

```
        JNC     CONTINUE
        INR     B
CONT :  DCR     C
INUE
        JNZ     AGAIN
        STA     0X0200
        MOV     A, B
        STA     0X0201
        HLT
```

Prob 18 : Prob 17 using 16-bit Arithmetic.

```
        MVI     B, 0X00
        LXI     H, 0X0100
        MOV     A, M
        LXI     D, 0X0000
AGAIN:  INX     H
        MOV     C, M
        XCHG
        DAD     B
        XCHG
        DCR     A
        JNZ     AGAIN
        XCHG
        SHLD    0X0200
        HLT
```

Eg: 0X0100 - 03
0X0101 - 45
0X0102 - B7
0X0103 - CD

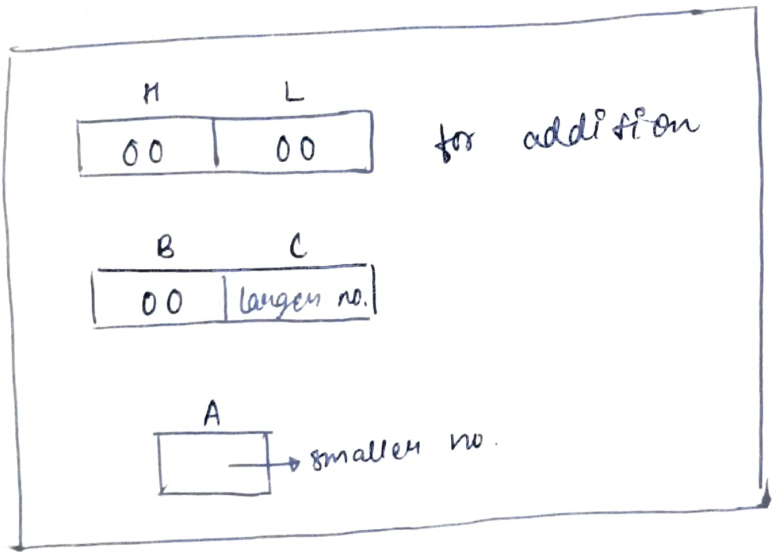
Prob 10 Multiplication of two 8bit no.s by repeated Addition.

0X0100 (Md) 0X0101 (Mr)

Result in 0X0102 - 0X0103 (16-bit) (Pd) 756C

Your program ~~must~~ should use minimum no. of addition.

→ Adding the larger no. ~~of~~ smaller no. of times.



Soln

```
        LXI   H, 0X0000
        MVI   B, 00
        LDA   0X0100
        MOV   C, A
        LDA   0X0101
        CMP   C
        JC    START
        MOV   C, A
        LDA   0X0100
START:  DAD   B
        DCR   A
        JNZ   START
```

if A > C ⇒ CY = 0, Z = 0
A < C ⇒ CY = 1

(H-L) ← (H-L) + (B-C)

```
        SHLD    0X0102
        HLT
```

→ Complexity : O(N)

$$\begin{array}{r} a\ b \\ \times\ c\ d \\ \hline \end{array} \qquad \begin{array}{l} a \times 10^1 + b \times 10^0 \\ c \times 10^1 + d \times 10^0 \end{array}$$

$ac \times 10^2 + (ad + bc)\,10^1 + bd \times 10^0$ → Partial Product Method

Prob 20: Two 8-bit no.s are available in 0X0100 & 0X0101 (dividend) (divisor)

Deride them by repeated subtraction & store the result in 0X0102 (quotient) & remainder in 0X0103

Soln

```
        LDA     0X0101
        MOV     B, A
        LDA     0X0100
        MVI     C,00
REPEAT: CMP     B
        JC      STORE
        SUB     B
        INR     C
        JMP     REPEAT
STORE:  STA     0X0103
        MOV     A,C
        STA     0X0102
        HLT
```

Prob 21 : In Prob 20 store the
after rounding off

Sol^n

```
        LDA     0X0101
        MOV     B, A
        LDA     0X0100
        MVI     C, 00
REPEAT: CMP     B
        JC      ROUND
        SUB     B
        INR     C
        JMP     REPEAT
ROUND:  ADD     A
        CMP     B
        JC      STORE
        INR     C
STORE:  MOV     A, C
        STA     0X0102
        HLT
```

Prob 22 Multiplication of 16 bit no. by a 8 bit no. by repeated addition.

Sol^n 16 bit no will be added 8 bit no. of times

→ multiply n x n → max digits (n+1)

16 bit : 0X0100 0X0101

8 bit : 0X0102

Result 0X0103 - 0X0105

	H	L	
H-L	00	00	→ for double add

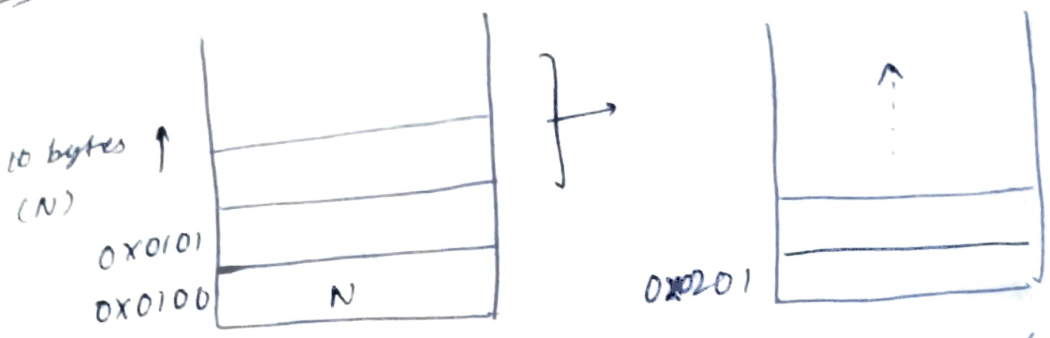
D	E
16 bit	No

A
8 bit No

B
00 Carry

```
        LHLD   0X0100
        XCHG
        LDA    0X0102
        MVI    B, 00
        LXI    H, 0X0000
AGAIN:  DAD    D
        JNC    NEXT
        INR    B
NEXT:   DCR    A
        JNZ    AGAIN
        SHLD   0X0103
        MOV    A, B
        STA    0X0105
        HLT
```

Prob 23 : Block move of data :



N bytes are available in 0X0101 onwards value of N is available in 0X0100. Move these N bytes to 0X0201 onwards.

Use

0X0100 ← H-L → Indirect addressing
0X0201 ← D-E

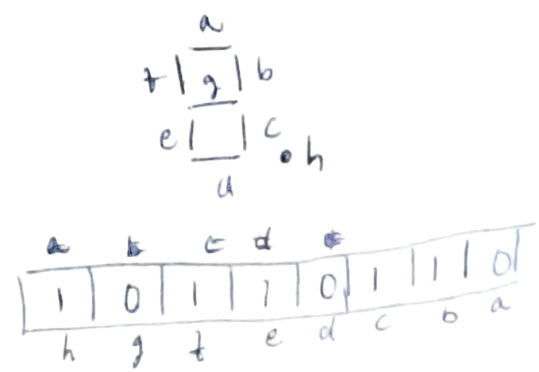
C
[N] → counting no. of bits

Soln

```
      LXI   H,0X0100
      MOV   C,M
      LXI   D,0X0201
AGAIN: INX  H
      MOV   A,M
      STAX  D
      INX   D
      DCR   C
      JNZ   AGAIN
      HLT
```

Look up Table :

01 →
02 →
05 → 6D



Prob 24: Finding the square using look-up table.

The no is (00-0f) is available in 0x0100. Store its square in 0x0101. Using the look up table available at 0x0202 onwards.

Sol^n 1. Load starting address of lookup table in H-L.

2. Load 0x0100 in ACC

3. Transfer it to C.

4. make B to 00.

5. DAD BC to HL

6. Get value from look up-table using HL as a pointer into A.

7. Store A as 0x0101.

Look up Table:

0x0202 : 00 → 0

0x0203 : 01 → 1

0204 : 04 → 2

0205 : 09 → 3

0206 : 10 → 4

0207 : 19 → 5

```
LXI     H, 0X0202
LDA     0X0100
MOV     C, A
MVI     B, 00
DAD     B
MOV     A, M
STA     0X0101
HLT
```

Prob 25 : Multiplication by partial product. 8 bytes are available in 0x0100, 0x0101. Result in 0x0109 - 0x0103

Sol"

```
      LDA    0X0100
      MOV    E, A
      LDA    0X0101
      MVI    D, 00
      LXI    H, 0X0000
      MVI    C, 0X08

AGAIN: RRC
       JNC    SHIFT
       DAD    D

SHIFT: XCHG
       DAD    H
       XCHG
       DCR    C
       JNZ    AGAIN
       SHLD   0X0102
       HLT
```

Eg: DE
× BE

```
    1101 1110   Md
  x 1011 1110   Mr
  ------------
    0000 0000
   1 1011 1 1 0 0
     0  0  0  0
```

} at every stage same no. shifted left.

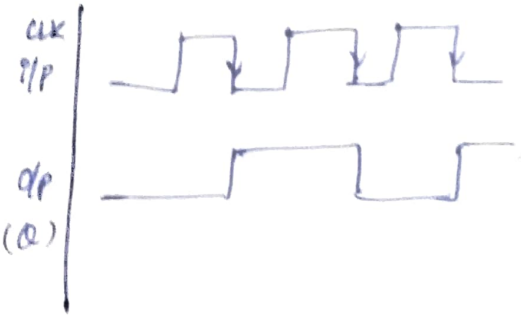
C	H	L	A	D	E
08	00	00	Mr	00	Md

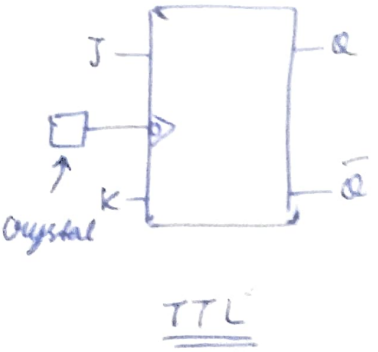
complexity : O(No. of bytes)

8085

Oscillator : Crystal oscillator → piezo electric crystal

6.144 MHz





TTL

→ frequency is halfed at o/p which means the μf

fan-out = 10

↓

max. no. of devices that can be derived by

→ If 100 needed then join 10 D-FF to make it 100

→ distance of each ff from clock must be same for synchronization at o/p end.

Stack (LIFO)

→ Instructions in 8085 that use stack

LXI SP, 16 bit address (0X3FFF — Assembler 0X0100)

PUSH PSW / B / D / H (PSW: Program status word (A+F))

POP PSW / B / D / H

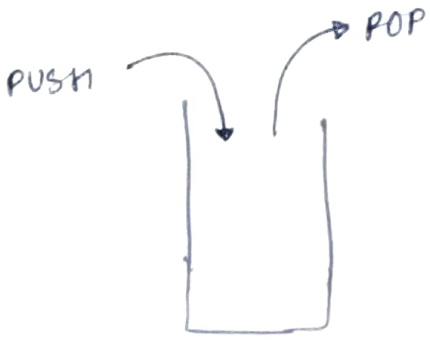
PCHL

XTHL

SPHL

HARA highest available RAM address

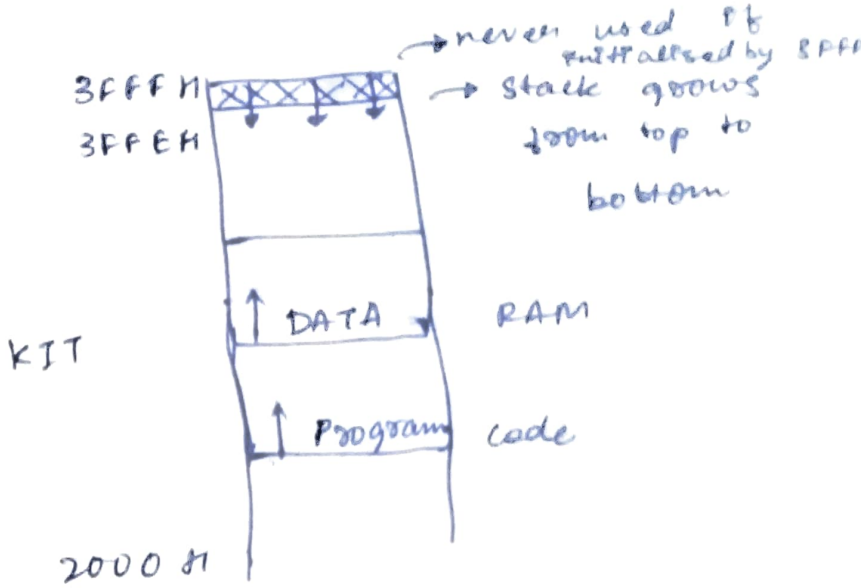
→ stack generally

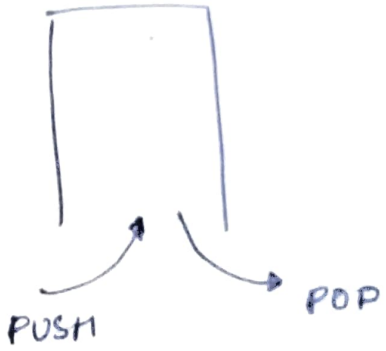


→ we initialize the stack with ~~highest~~ HARA + 1

→ It will reduce the address first then PUSH.

→ In 8085





MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Measurements & Instrumentation (ECT-216)

End-Term Examination, 23rd May 2022

Maximum Time Allowed – 2:30 hrs **MM-50**

This question paper consists of 6 questions and 2 pages.

1.

a) What are thermocouples? Explain the operating principle of thermocouples. State the expression which relates emf of the thermocouple and temperature. **(2)**

b) Find the linear and quadratic approximation of resistance between 120°C and 160°C about the mean temperature of 140°C. The following table may be used. **(5)**

T (°C)	100	120	140	160	180
R (Ω)	723.15	738.94	751.53	762.78	774.57

2.

(a) Why 4-terminal measurement is preferred over 2-terminal measurement for low resistance measurement? Explain with necessary circuit diagrams. **(3)**

(b) Explain the loss-of-charge method of high resistance measurement. How leakage resistance of the capacitor can be extracted from the measured high resistance? Explain with suitable diagrams and expressions. **(4)**

3.

(a) Derive the expression of the power factor when it is measured in a balanced 3-φ system using 2-wattmeter method with necessary phasor diagram. **(4)**

(b) A 3-φ load has a power factor of 0.47. If the input power indicated by two-wattmeter method is 37 kW, then determine the readings of each of the wattmeter. **(2)**

4.

(a) A Wheatstone bridge has P = 5000 Ω, Q = 50 Ω, R = 8010 Ω, S = 80 Ω. The supply voltage is 8 V and the current sensitivity and resistance of the galvanometer is 5 mm/μA and 200 Ω respectively. Calculate the deflection in the galvanometer and deflection per unit change in R. **(4)**

(b) AC Bridge shown in fig. 1 operates at supply frequency of 100 Hz. Standard capacitance C_1 is 0.3 μF. Balance is achieved when R_1 = 270 kΩ, R_3 = 8 kΩ and R_4 = 12.5 kΩ. Determine the resistive and capacitive components of the measured capacitor and its dissipation factor. If standard capacitance C_1 varies between 0.25 μF to 0.35 μF, determine the range of measured components. **(4)**

(c) AC Bridge shown in fig. 2 operates at supply frequency of 100 Hz. This bridge is balanced when C_3 = 0.25μF, R_1 = 1.9 kΩ, R_3 = 72 Ω and R_4 = 615 Ω. Calculate the resistive and inductive components of the measured inductor and its quality factor. Also calculate these components for a series equivalent circuit. **(5)**

5.

(a) Explain the construction and working principle of PMMC type instruments with necessary diagrams? Derive the corresponding torque equation. **(2+2+2)**

(b) A PMMC instrument has FSD of 50 μA and coil resistance of 5 kΩ. A 3-resistance Ayrton shunt is connected across it as shown in fig. 3 with R_1 = 0.02 Ω, R_2 = 0.48 Ω, and R_3 = 2.5 Ω. Calculate the three ranges of the ammeter. **(3)**

(c) In fig. 4, the PMMC instrument has FSD of 100 μA with R_m = 50 Ω, R_1 = 7.5 kΩ, initial R_2 = 50 Ω and initial E_b = 1.5 V. Determine the initial R_x value at 0.5FSD. If E_b falls to 1.2 V, calculate the new value of R_2 and new R_x value at 0.5FSD. **(4)**

6.

(a) The inductance of MI ammeter with FSD of 75° at 2 A is given by $L = 70 + 30\theta - 30\theta^2 \mu H$, where θ is deflection in radian from the zero position. Estimate the angular deflection of the pointer for a current of 1A. **(3)**

(b) For an electrodynamometer type ammeter, the mutual inductance M is given as $M = -8\cos(\theta + 60°)\, mH$, where θ is deflection in degrees. Find the deflecting torque at DC current of 30mA if that produces a deflection of 40°. **(2)**

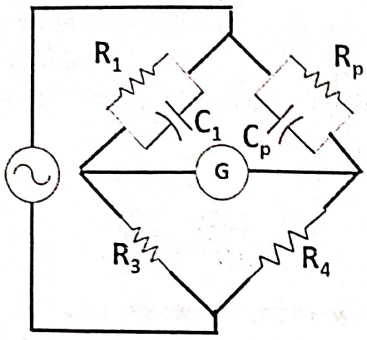


Figure 1

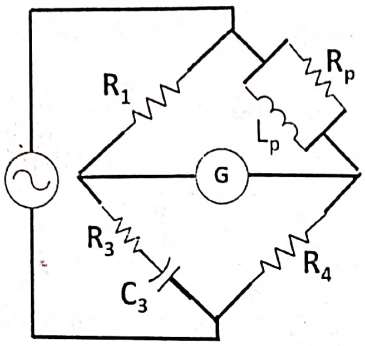


Figure 2

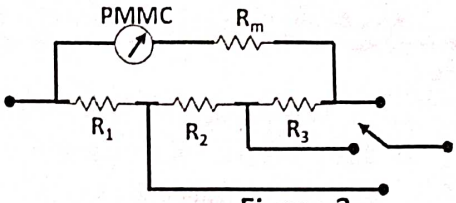


Figure 3

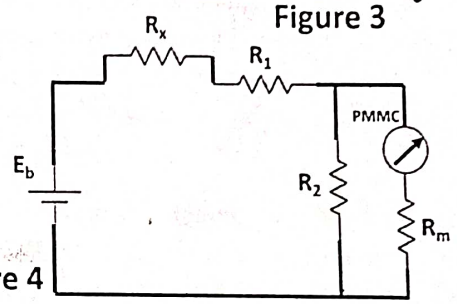


Figure 4

Department of Electronics & Communication Engineering

End-term exam

B.Tech. IV semester (ECE)

ECT- 212: Analog Communication

24th May 2022

0800-1030 hrs.

Max. marks: 50

Course Outcomes:

CO1	An understanding of various signals and different filters.
CO2	Amplitude Modulation and its variants (AM, DSBSC, SSB, VSB) and their modulators and demodulators, FDM
CO3	Frequency Modulation and its variants (NBFM, WBFM) and their modulators and demodulators
CO4	Sampling of analog signals, Pulse modulation techniques (PAM/PWM/PPM): their modulators and demodulators
CO5	Digital Modulation/ Pulse Code Modulation , noise , channel capacity, TDM

All questions are of 5 marks each

Q.1 (a) 250 persons in Jaipur need to talk to some different 250 persons in Delhi. How will it be possible to transmit these voice signals using Amplitude Modulation over a channel with a bandwidth of 1MHz.

(i) What will be the bandwidth that will be provided to each person over the channel?
(ii) What are the different filters needed in this communication system?
(iii) What type of multiplexing needs to be done for transmission?

Draw a schematic diagram also that explains the above communication system.

CO1, CO2

(b) What are the details provided by the Fourier series/ transform of a signal? How does it help in design of a communication system?

CO1

Q.2 (a) The power of carrier wave when a signal is transmitted using vestigial side band (VSB) modulation is 50%, as compared to the Full AM signal (LSB+carrier+USB). Draw the schematic diagram of this vestigial side band (VSB) modulation and find the response of the filter used in this scheme.

CO2

(b) Can a coherent detector be used to demodulate a DSBSC wave? Evaluate the effect if the local oscillator at the receiver has a frequency error Δf, as compared to the that carrier generated by the local oscillator at the transmitter.

CO2

Q.3(a) A carrier is frequency modulated by message signal

$$m(t) = A_{m1} \cos(2\pi f_{m1} t) + A_{m2} \cos(2\pi f_{m2} t)$$

resulting in the output

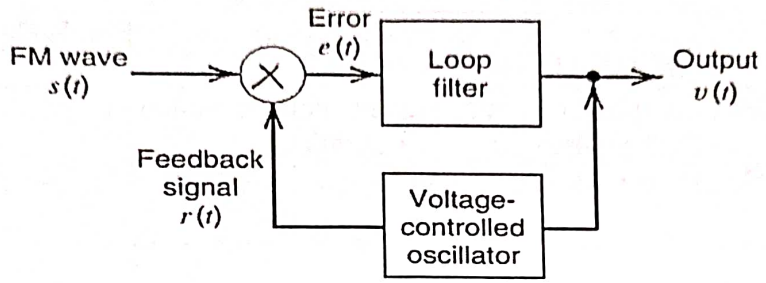
$$s(t) = A \cos [\, 2\pi f_c t + \beta_1 \sin (2\pi f_{m1} t) + \beta_2 \sin (2\pi f_{m2} t) \,]$$

(i) Show that the Fourier transform of this FM wave has sidebands separated from the carrier at multiples of f_{m1}, f_{m2} , $(f_{m1} + f_{m2})$ and $(f_{m1} - f_{m2})$.

(ii) What will be the bandwidth of the channel required to transmit such a WBFM modulated signal ?

CO3

(b) Shown below is the schematic of a FM receiver.



Show mathematically, how it recovers the message signal form the received WBFM wave. Why is this scheme named Phase Locked Loop? What is the transfer function of the filter first order PLL for such a scheme?

CO3

Q.4(a) An analog signal g(t) is sampled at a uniform rate, once every Ts seconds. We obtain an infinite sequence of sample values g{n / 2W } where Ts = 1/2W . Show mathematically how to reconstruct the signal g(t) from the sequence of the sample values g{n / 2W }.

CO4

(b) Find the spectra of the sampled signal s(t) which is obtained by applying a analog signal g(t) to a switching circuit controlled by a sampling function c(t) that consists of an infinite succession of rectangular pulses of amplitude A and occurring with periodic Ts.

CO4

Q.5(a) How is an analog message signal converted to a digital stream of bits using T1 carrier (PCM) system? Specify all the parameters used in such a system such as, the cutoff frequency of the LPF which passes the voice signal, the standard sampling rate, total no. of bits sent per frame, resultant transmission rate etc. How many number of voice channels are supported by this system?

CO5

(b) Why is a Prediction filter needed in the Differential Pulse Code Modulation? Draw its block diagram and show how is it needed in its transmitter and receiver circuits.

CO5

Malaviya National Institute of Technology, Jaipur

End Term Examination (2021-22)

2nd Year B.Tech 4th Semester

Branch: ECE
Maximum Marks:50

Sub: Applied Electronics
Time: 2.5 Hours

Note: All Questions are Compulsory and marks for Correspondence questions are written in front of Questions.

CO1: Understanding different modes of Schmitt trigger
CO2: Implementing circuits with Operational amplifier
CO3: Understanding different types of power amplifiers
CO4: Applying the voltage regulator in different configuration
CO5: Understanding PLL and its usage

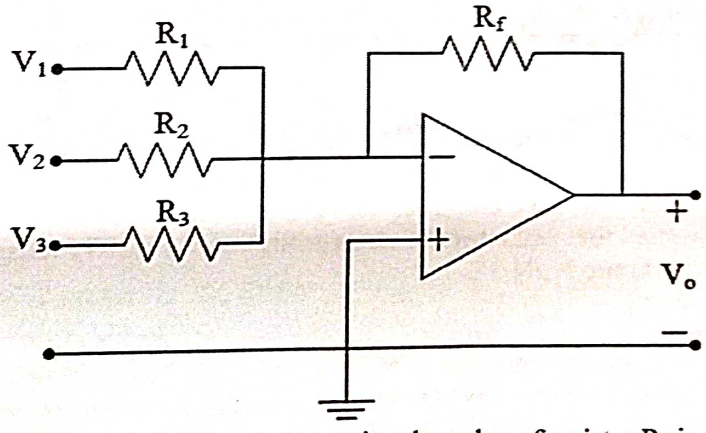
**********ALL THE BEST**********

Q1. Short answer type questions. (1 × 10) (CO1 to CO5)

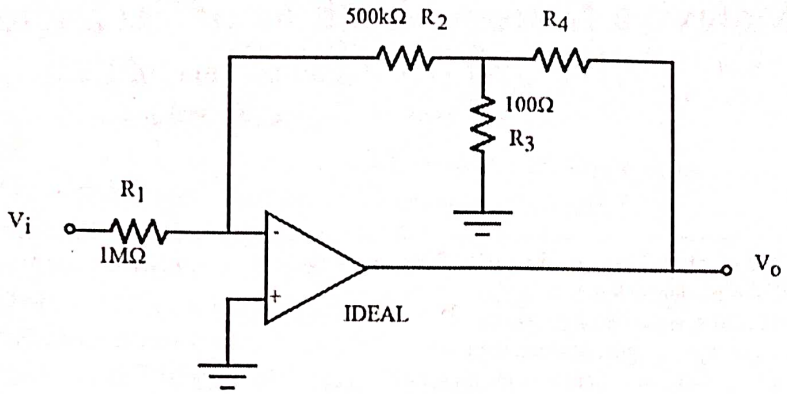
1. Define OPAMP and briefly describe the block diagram of OP-AMP?
2. List three types of Linear IC Packages?
3. What are the three operating temperature ranges of IC?
4. Give the classification of types of ICs according to the fabrication?
5. List the important characteristics of the comparator.
6. What do you mean by Butterworth response?
7. What causes the gain of the OPAMP to roll off after a certain frequency is reached?
8. Explain the basic difference between a Comparator and a Schmitt Trigger?
9. What are the advantages of Active filters over Passive filters?
10. What are the causes of Slew Rate?

Q2. (a) Explain the working of sample and hold circuit in detail along with its applications. (4) (CO2)
(b) What is the need of peak detector circuit? Explain its working in detail. (3) (CO2)

Q3. (a) Calculate the output voltage of an op-amp summing amplifier for the following sets of voltages and resistors. Given, Rf = 1 MΩ. (3) (CO2)
V1 = 1V, V2 = 2V, V3 = 3V; R1 = 500 kΩ, R2 = 1 MΩ , R3 = 1 MΩ.



(b) Evaluate the following amplifier circuit to determine the value of resistor R_4 in order to obtain a voltage gain (Vo/Vi) of -120 (3) (CO2)

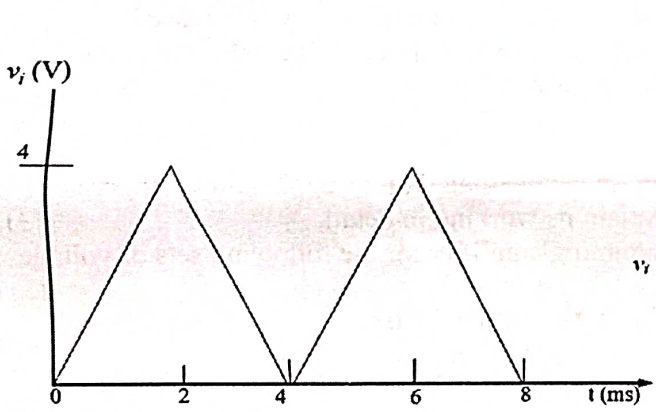


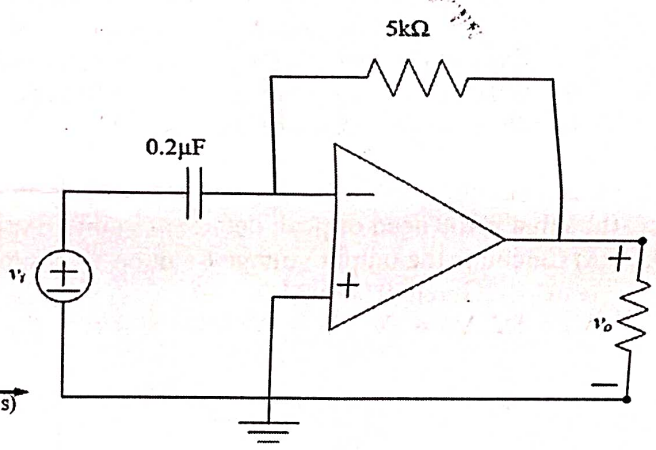
Q4. (a) Explain PLL. What is its Free Running Frequency, Capture mode and Locked Mode. (5) (CO5)

(b) Explain the successive approximation type ADC and also compare it with Counter type ADC in terms of its conversion time. (5) (CO2)

Q5. (a) Design an inverting Schmitt trigger for the threshold points ±2V. Given I = 50μA and the device saturates 1V below the DC supply. Assume V_{cc} = 12V. (4) (CO1)

(b) Sketch the output voltage waveform *vo(t)* for the circuit shown, given the input voltage waveform below. (3) (CO2)





Q6. (a) Derive the efficiency and figure of merit (FOM) of CLASS-B Pushpull power amplifier. What are the advantages and disadvantages of CLASS-B Pushpull power amplifier (6) (CO3)

(b) A Class-A transformer coupled amplifier delivers maximum AC power of 5 Watts to 4Ω load. The operating point is located for symmetrical swing (centre). If V_{cc} = 20V, calculate: (4) (CO3)

a) Transformer turns ratio N_2/N_1
b) Peak output current
c) Operating point
d) Efficiency

**********END**********

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
END TERM EXAM IV SEM. 2021-22
MICROPROCESSORS

TIME: 2.30 Hours **MAX.MARKS: 60**

Note: Attempt ANY SIX Questions.
ALL QUESTIONS CARRY EQUAL MARKS.

1. A) Write a program to multiply two 8-bit numbers available at 0x0100 and 0x0101 by paretial product method and store the result in 0x0102-0x0103.
   B) A group of 200 bytes are stored from location 0x2000 onwards. Write a program to count the number of bytes with value 0xFF and store the result in 0x3000. (For example: if 30 locations have value 0x0F, the result should be 0x1E.).

2. A) Write a program to convert a given one byte hexadecimal number available at 0x0100 in its equivalent BCD and store the result at location 0x0101-0x0102. The maximum result can be maximum 0x0255. (For example: if the input is 0x67, the result should be 0x0103).
   B) Division of two 8-bit nos. by repeated subtraction and rounding off the result. The dividend is available in 0x0100 and divisor in 0x0101. The result (rounded off quotient) should be stored in 0x0102.

3. A) Generate and store first N terms of Fibonacci series and store them in consecutive locations (max. value 0xFF) from location 0x0101 onwards. The value of N is stored in 0x0100.
   B) Summing the series 1+3+5+7..... N terms. The result will be maximum 16-bits. The value of N is available in 0x0100 and the result should be in 0x0101-0x0102.

4. A) A group of 100 bytes are stored in location 0x0200 onwards. Find the largest of them and store it in 0x0300.
   B) BCD to hex. conversion for maximum value of 99. A BCD number is available in location 0x0100 . Convert it to Hex. And store it in 0x0101. (For example: for value 99, the result should be 0x63).

5. A) Explain the interrupt structure of 8085 microprocessor. Explain the meaning of vectored interrupts.
   B) Explain RIM & SIM instructions and explain how they are used to control interrupts.

6. A) What is a stack. Show how a stack can be used to enable subroutine entry & exit. Explain instructions related with stack in 8085.
   B) Write a subroutine to multiply two 8-bit numbers by repeated addition and use this subroutine to find factorial of a number. The result will be maximum 16-bits. Clearly state the assumptions made.

7. A) Explain the working of R/2R ladder D/A converter. What are its advantages over weighted registers D/A converter.
   B) Explain the working of successive approximation type A/D converter. Also write a program for its operation by software controlling. What are its advantages

8. A) Give the interfacing block diagram for 8K ROM at location 0x0000 onwards.
   B) How will you interface a 4K RAM at location 0x8000 onwards.
   Clearly state the chip-select and in-chip select lines and logic diagram to achieve the interfacing.

9. A) Explain Handshaking signals and how they are used for input and output devices.
   B) Draw the block diagram of 8255 chip and explain its operating modes.

10. A) Draw the block diagram of 8155 and explain its features.
    B) Explain the features of 8279.

Malaviya National Institute of Technology Jaipur

Department of Electronics & Communication Engineering

End Term Exam: ECT214 Electromagnetic Field Theory

Max. Marks 40 Max. Time 2:30 hrs.

Attempt all questions in serial order. All questions carry equal marks.

Q.1 Consider the dipole configuration as shown fig.1. Due to this dipole, first find electric potential V at point P and then obtain the electric field strength E at point P.

Q.2 Given F= a_x xy - a_y 2x, verify Stoke's theorem over a quarter – circular disk with a radius 3 in the first quadrant as shown in fig.2, where a_x and a_y are the unit vectors.

Q.3 Three point charges of values 1C, 2C and 3C are situated at the corners of an equilateral triangle of sides 1m. Find the work required to move these charges to the corners of an equilateral triangle of shorten sides $\frac{1}{2}m$ as shown in fig.3.

Q.4 Explain Continuity Equation and Relaxation Time.

Q.5 State Poynting's Vector Theorem. Starting from Maxwell's equation, drive the Poynting's Vector Theorem and explain its physical interpretation.

Q.6 Evaluate the complex number $Z_1 = j(3-j4)^* / (-1+j6)(2+j)^2$

Q.7 The electric field and magnetic field in free space are given by

$\mathbf{E} = (50/\rho)\ \mathrm{Cos}(10^6 t + \beta z)\ a_\phi$ V/m

$\mathbf{H} = (H_o/\rho)\ \mathrm{Cos}(10^6 t + \beta z)\ a_\rho$ A/m

Express these in phasor form and determine the constants H_o and β such that the fields satisfy Maxwell's equations.

Q.8 If there is a magnetic field represented by

$$B = 2\sin(\omega t - \beta x)\ a_x + 2y\cos(\omega t - \beta x)\ a_y$$

In a medium where $\rho_v = 0$, $\sigma = 0$ and $J = 0$, find the electric field. Assume $\varepsilon_r = 1$, $\mu_r = 1$.

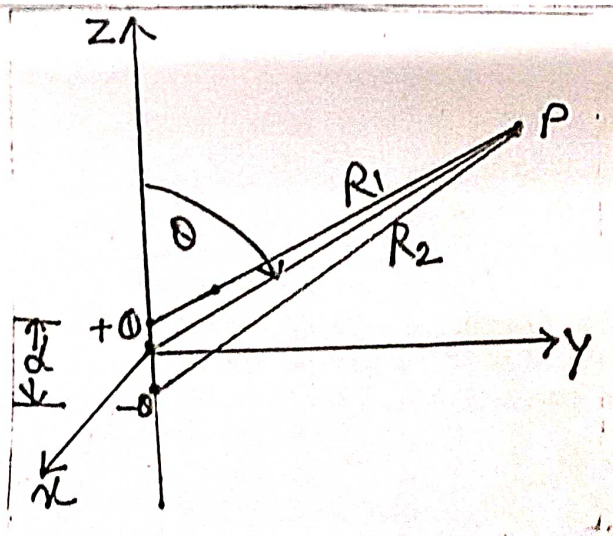


Fig 1

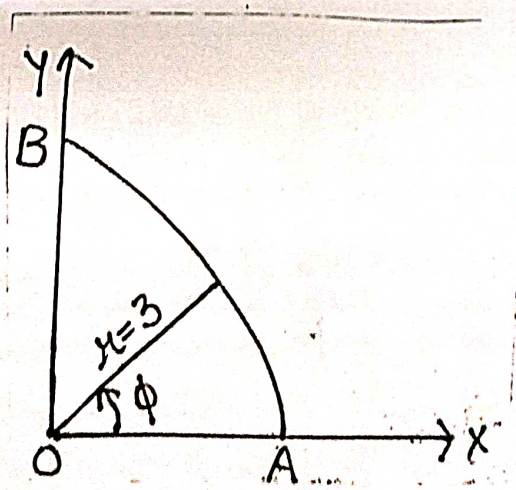


Fig 2.

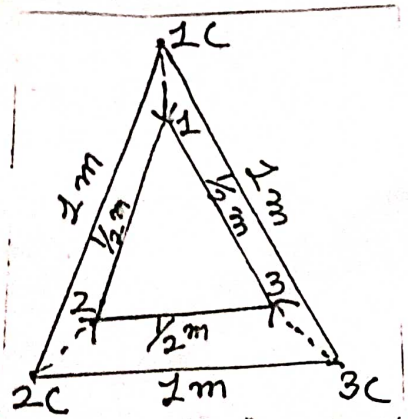


Fig 3

ECT 215: Operating Systems
End Term Examination-2022
Time Limit: 2 hour and 30 minutes

Instructions

The total number of marks is 50. All questions are to be attempted. The usage of **all electronic items/gadgets are prohibited** except the scientific calculators. ***Please precisely answer whatever asked in the question, otherwise there will be deduction of marks.***

The course outcomes (**CO**s)

CO1: To understand the objectives, structures and functions of modern operating systems

CO2: To understand the working of processes and threads and their scheduling algorithms

CO3: To understand the problems of synchronization and deadlock in OS and its various solutions

CO4: To understand the memory and storage handling/allocation methods

CO5: To understand files, its structures, implementation and protection issues

CO6: To analyze the problems related to OS and suggest viable solutions (analytically and design issues)

Q.1. Consider the following snapshot of a system with four type of resources (A, B, C, D):

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

a. What is the content of the matrix Need?

b. Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

c. If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately and in what sequence of processes? (CO3,6) (2+4+4)

Q.2. Consider the following set of processes, with the length of the CPU burst given in milliseconds:

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

a. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).

b. What is the turnaround time of each process for each of the scheduling algorithms in part a?

c. What is the waiting time of each process for each of these scheduling algorithms?

d. Which of the algorithms results in the minimum average waiting time (over all processes)? (CO2,3,6) (4+4+4+2)

Q.3. Briefly explain following terms: (CO4,5)

a. Internal and external fragmentation. (3)
b. Swapping (2)
c. Dynamic & static linking (3)
d. Sockets (2)
e. Semaphore (3)

Q.4. Consider the code segment below. The thread_create() function starts a new thread in the calling process. (For the purpose of this problem, you can ignore the lack of arguments to that function.) How many unique processes and unique threads are created? Justify. (CO2) (7)

```
pid_t pid;
pid = fork();
if (pid == 0) { // Child process
    fork();
    thread_create( . . . ); }
fork();
```

Q.5. Explain how Peterson's algorithm for solving critical-section problem satisfy the three requirements. (CO3)(6)

Department of Electronics & Communication Engineering

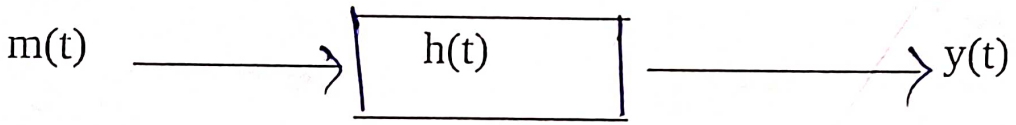
B.Tech. IV semester (ECE) — 4th April, 2022

Mid-term exam — 0800-0930 hrs.

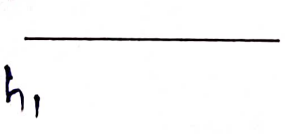
ECT- 212: Analog Communication — Max. marks: 30

All the questions are compulsory

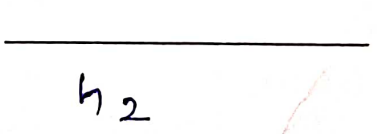
Q.1(a) **CO1** Evaluate the output response y(t) of the circuit. The impulse responses h(t) / H(f) are given below



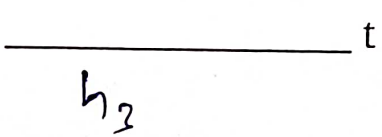
(i)



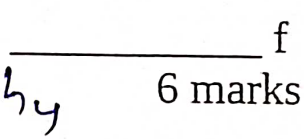
(ii)



(iii)



(iv)



6 marks

Q.2(a) **CO2** A message signal m(t), whose fourier transform is shown below, is to be sent from one point to the other via a channel.

What are the different ways to send the same. Explain the advantages and the disadvantages of one over the other method, in a tabular form.

10 marks

(b) A DSBSC wave is demodulated with a coherent detector

(i) Evaluate the effect of a frequency error Δf in the local carrier frequency of the detector, measured with respect to the carrier frequency of the incoming DSBSC wave.

(ii) For the case of a sinusoidal modulating wave, show that because of this frequency error, the demodulated wave exhibits *beats* at the error frequency. Illustrate your answer with a sketch of this demodulated wave. 4 marks

Q.3(a) How is the the Bessel function useful in the evaluation of the fourier transform of the Wideband
CO3 Frequency Modulated (WBFM) wave? 7 marks

(b) How do we approximate the bandwidth of a WBFM wave?

3 marks

Course Outcomes:

CO1	An understanding of various signals and different filters.
CO2	Amplitude Modulation and its variants (AM, DSBSC, SSB, VSB) and their modulators and demodulators, FDM
CO3	Frequency Modulation and its variants (NBFM, WBFM) and their modulators and demodulators
CO4	Sampling of analog signals, Pulse modulation techniques (PAM/PWM/PPM): their modulators and demodulators
CO5	Digital Modulation/ Pulse Code Modulation , noise , channel capacity, TDM

DEPARTMENT OF ECE, MNIT JAIPUR

Subject Code: ECT-213 MTE Name: MICROPROCESSOR

Time: 1 Hour 30 Minutes Max. Marks: 30

Attempt all questions. 8085 microprocessor is used in all questions. Use of Instruction sheet is permitted.

1. a) Explain follwing instructions of 8085 with an example:
   XCHG, RAR, LDAX, LXI, LHLD, DAA
   b) Explain various addressing modes of 8085 with one example of each.

2. Explain the method of following:
   a) Demultiplexing AD0-AD7 lines into A0-A7 and D0-D7 lines
   b) Generating (MEMR', MEMW', IOR' and IOW') from (IO/M', RD' and WR') signals

3. Interface the following to 8085 microprocessor:
   2K x 8 ROM at location 0x0000
   4K x 8 RAM at location 0x1000
   Draw the block diagram clearly indicating chip-select and in-chip select lines.

4. A series of N bytes is available in location 0x0101 onwards. the value of N is stored in 0x0100. Add these bytes and store the result in 0x0200-0x0201 taking into account the carry generated in each stage
   a) using 8-bit arithmetic instructions
   b) using 16-bit arithmetic instructions

5. a) A byte is stored in location 0x0100. Multiply it by 2 by bit rotation and store the result in location 0x0101-0x0102 (the result will be more than 8 bits).
   b) A byte is stored in location 0x0100. Separate its nibbles and store them at location 0x0101 and 0x0102. (if the byte is 0x4F in 0x0100, 0x0F should be in 0x0101 and 0x04 in 0x0102).

Malaviya National Institute of Technology, Jaipur

Mid Term Examination (2021-2022)

2nd Year B. Tech 4th Semester

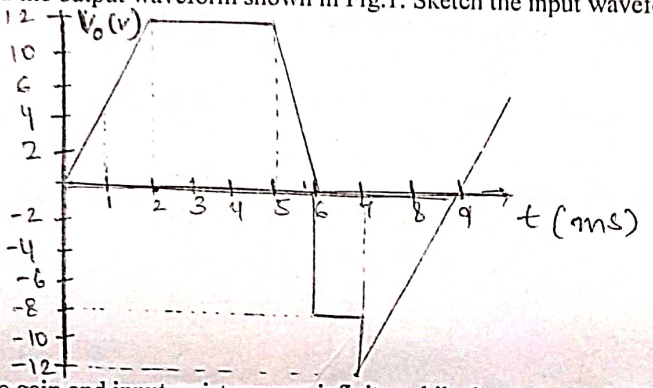
Branch: ECE | **Sub: Applied Electronics (ECT211)**

Maximum Marks: 40 | **Date:** **Time:** **Hour**

Note: All questions are compulsory and marks for corresponding questions are written in front of the questions.

CO1: Understanding different types of power amplifiers and Basics of OPAMP
CO2: Implementing arithmetic, logical circuits with Operational amplifier and performance as analog computation
CO3: Design of Feedback Amplifier, Oscillator, Generators and Multivibrators using OPAMP
CO4: Waveshaping circuits using OPAMP
CO5: Understanding PLL and its usage

Q1. An amplifier has a gain of -5 and the output waveform shown in Fig.1. Sketch the input waveform. (CO2) (3)



Q2. For an ideal op-amp, the voltage gain and input resistance are infinite, while the output resistance is zero, what are the consequences for (CO2) (3)

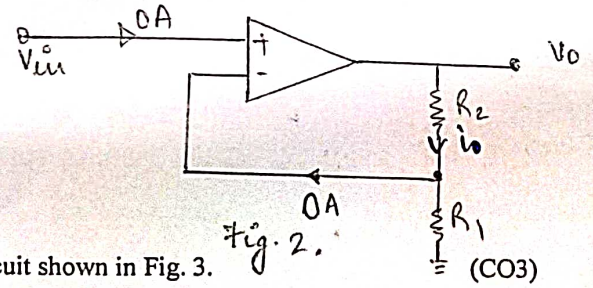
(a) The op-amp's input voltage?

(b) The op-amp's input currents?

(c) The op-amp's output current?

Q3. An op-amp based amplifier has ± 18V supplies and a gain of -80. Over what input range is the amplifier linear? (CO2) (3)

Q4. Determine the gain of the amplifier shown in Fig 2. What is the value of I_0? (CO2) (3)



$R_2 = 20\,K\Omega$
$R_1 = 3.3\,K\Omega$
$V_{in} = 2\,V$

Fig. 2.

Q5. Calculate V_0 for the circuit shown in Fig. 3. (CO3) (3)

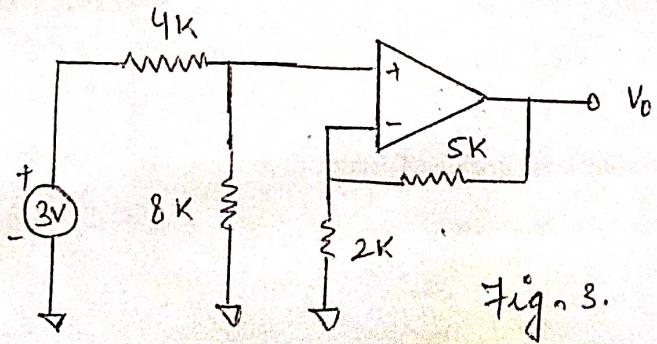


Fig. 3.

Q6. Find V_0 for the circuit shown in Fig. 4. (CO3) (3)

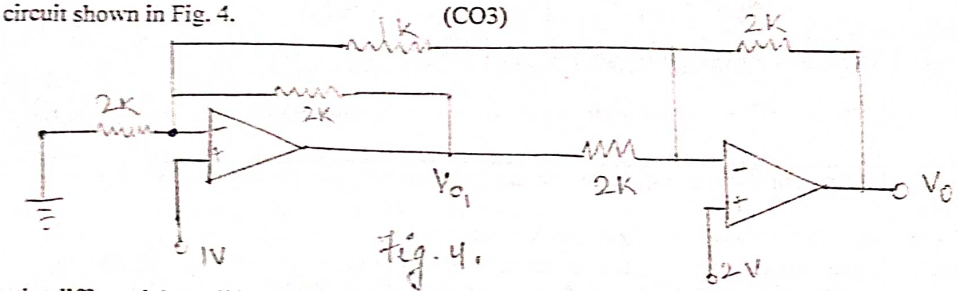


Fig. 4.

Q7. Find CMRR for the differential amplifier shown in Fig. 5. (CO1) (3)

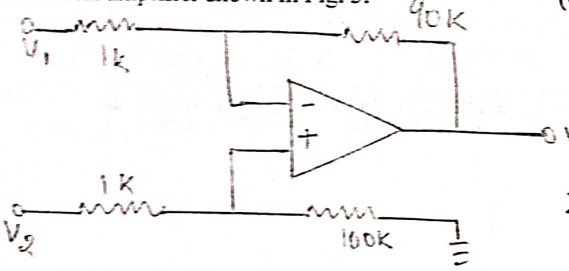
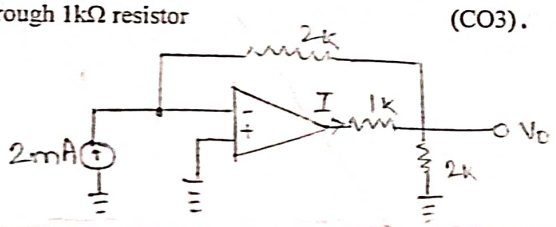


Fig. 5.

Q8. Find V_0 and then the current I through 1kΩ resistor (CO3). (3)

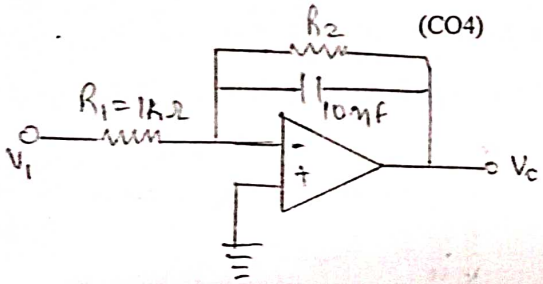


Q9. Design an op-amp circuit for the following computation (CO2) (3)

$$(4V_a + 6V_b + 3V_c) - (7V_1 + V_2 + 5V_3)$$

Assume: $R_F = 10\ K\Omega$ and $Ra = 1K\Omega$

Q10. Consider the op-amp to be ideal. For the low pass filter shown in Fig. 7, for a cutoff frequency of 5KHz, the value of R_2 in (KΩ) is (CO4) (3)



Q11. Define the following terms (CO1, CO2)

(a) Slew rate and its significance. (2)

(b) CMRR and its significance. (2)

(c) Input bias current. (1)

(d) Symbol and PIN diagram of op-amp. (2)

(e) List two reasons why open loop op-amp is unstable for linear applications. (2)

(f) Which configuration offers the best immunity to induce noise? (2)

ECT 215: Operating Systems
Mid Term Examination
Time Limit: 1 hour and 30 minutes

Instructions

The total number of marks is 30. All questions are to be attempted. The usage of **all electronic items/gadgets are prohibited** except the scientific calculators. ***Please precisely answer whatever asked in the question, otherwise there will be deduction of marks.***

The course outcomes (COs)

CO1: To understand the objectives, structures and functions of modern operating systems
CO2: To understand the working of processes and threads and their scheduling algorithms
CO3: To understand the problems of synchronization and deadlock in OS and its various solutions
CO4: To understand the memory and storage handling/allocation methods
CO5: To understand files, its structures, implementation and protection issues
CO6: To analyze the problems related to OS and suggest viable solutions (analytically and design issues)

1. What is the difference between kernel and user mode? Which of the following instructions should be allowed only in kernel mode and why? (a) Disable all interrupts, (b) Read the time-of-day clock, (c) Set the time-of-day clock, (d) Change the memory map. (CO1) (4)
2. Using the program shown below, explain what the output will be at Line A and why. (CO2) (4)

```
int sum = 5;
int main() {
pid_t pid;
pid = fork();
if (pid == 0) {/* child process */
        sum += 15;
        return 0; }
else if (pid > 0) {/* parent process */
        wait(NULL);
        printf("PARENT: sum = %d", sum); /* LINE A */
        return 0;}}
```

3. An application has 20% of code that is inherently serial. Theoretically, what will its maximum speedup be if it is running on a multicore system with four processors? (CO2) (4)
4. Including the initial parent process, how many processes are created by the program shown below? Prove the justification. (CO2,CO3) (5)

```
int main(){
        int i;
        for (i = 0; i < 4; i++)
                fork();
        return 0; }
```

5. What information related to a process is stored in Process control block (PCB)? What is the role of PCB in context switch? (CO2,CO3) (5)
6. Draw the state diagram of a process. (CO2) (3)
7. Predict the output of following program. Is there any possibility of creation of zombie process? (CO2) (5)

```
int main()
{
  if (!fork()) {
    if (!fork()) {
      printf("Child \n");
    }
    else {
      printf("Child \n");
      fork(); }
  }
  else {
    printf("Parent \n");  }
  printf("End \n");
  return 0; }
```

MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Measurements & Instrumentation (ECT-216)

Mid-Term Examination, 03rd April 2022

Maximum Time Allowed – 1:30 hrs | MM-30

This question paper consists of 5 questions and 1 page.

1.

a) What type of damping mechanisms are used in PMMC, MI and electrodynamometer type instruments and why? **(3)**

b) What is the problem in basic ohmmeter and how is it resolved? **(2)**

c) What are the main differences between PMMC and electrodynamometer type instruments? **(1)**

d) How do electrodynamometer instruments measure power? Draw the figure indicating fixed and moving coil arrangement for power measurement. **(2)**

e) Derive the relevant torque equation for MI instruments. **(4)**

2. The PMMC instrument with FSD = 100μA and Rm = 2 kΩ is to be used in a half-wave rectifier voltmeter, which reads 100 V at full scale. If the diode peak current at FSD is 700 μA, *determine the* value of series resistance R_s and shunt resistance R_{sh} *in the rectifier* voltmeter circuit. **(4)**

3. For an electrodynamometer instrument, M can be given as $M = \tan(\theta + 30°) + \sin(\theta + 15°)\ H$, where θ is the deflection in degrees. Determine the deflecting torque at DC current of 10 mA and 15 mA with corresponding deflections of 30° and 45° respectively. **(4)**

4. In certain MI instrument, current and the deflection are related as $I = 5\theta^2$, where θ is the deflection in radian. Spring constant is 0.35 N-m/rad and self-inductance at zero current is 50 mH. Determine inductance as a function of θ. Also calculate deflection and meter current at inductance of 35 mH and 20 mH. **(5)**

5. Certain MI instrument with FSD of 50 mA has a resistance of 500 Ω and inductance 0.5 H. Determine the multiplier resistance required to convert this into 300 V voltmeter. If the instrument reads correctly at AC 50 Hz, determine the difference in AC and DC voltage readings at i) 200 V and ii) 100 V. **(5)**