[11] Find out whether or not OTA-C circuit of Fig. 11 is a sinusoidal oscillator? If not, how you can modify this circuit to realize a sinusoidal oscillator? Determine the condition of oscillation and frequency of oscillation of the corrected circuit.

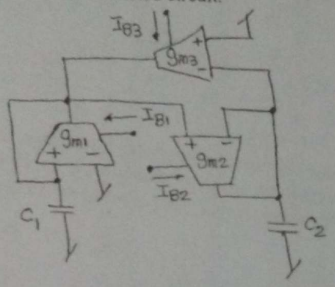


Fig.11

[12] Analyze the circuit of Fig. 12 and sketch the waveforms at pin no 3, v_o and calculate the frequency of the waveform.

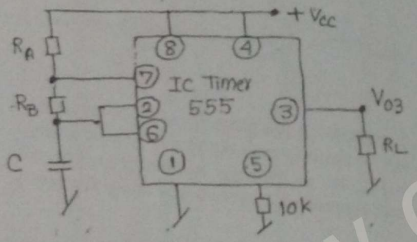


Fig. 12

[13] (a) Explain the working of the *Gilbert* multiplier as a phase detector (b) Devise a circuit using analog multipliers, op-amps and resistors, which can generate a sinusoidal waveform of frequency $3\omega_o$ from the given input signal $V_{in} = V_m \sin(\omega_o t)$.

[14] Write short notes on any two of the following

(a) IC Phase Locked Loop
(b) Negative Impedance Converter
(c) Level Shifter
(d) Slew Rate and CMRR

Total No. of Page(s): 04

FIFTH SEMESTER *Roll No* .....

B.E. (ECE/ICE/COE)

B.E. END SEM. EXAMINATION, NOV-2015

ECE/ICE/COE- 304 **Linear Integrated Circuits**

Time: 3:00 Hrs. Max. Marks: 70

Note: ATTEMPT ANY TEN QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

[1] Using ideal op-amps determine the impedance simulated by the one-port network of Fig. 1 and draw its passive equivalent.

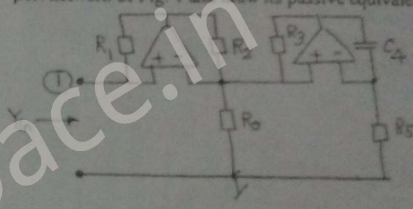


Fig.1

[2] For the sinusoidal oscillator circuit in Fig.2, derive the condition of oscillation and frequency of oscillation. Assume op-amps to be ideal.

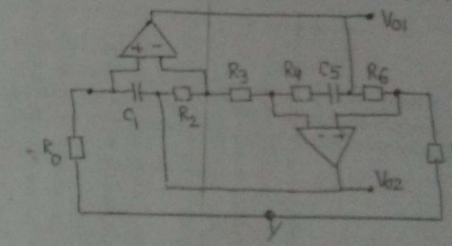


Fig. 2

[3] Devise an OTA-circuit (using a minimum possible number of OTAs but no more than two capacitors) which can implement the biquad filter whose block diagram is as shown in Fig. 3.

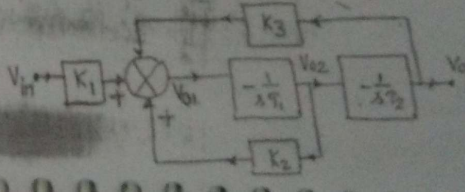


Fig. 3

[4] Analyze the circuit of Fig. 4 and find out the type of the filter realized by the circuit. Calculate the DC gain, Q_0, and ω_0.

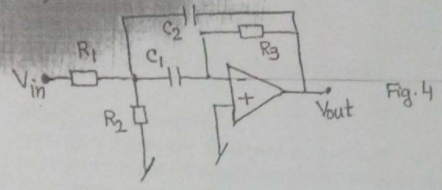


Fig. 4

[5] Assuming finite and frequency-dependent gain of the op-amp, derive the non-ideal transfer function of the circuit of Fig.5 and hence, determine the type of the filter realized by the circuit. Determine the maximum value of Q_0 which can be realized by this circuit.

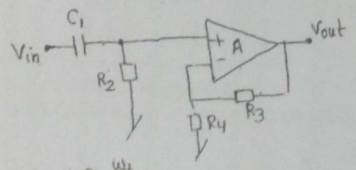


Fig. 5

Take $A \cong \frac{\omega_t}{s}$

[6] Assuming $A_i \cong \omega_{ti}/s = 1/s\tau_i$, i=1,2, where ω_t is the gain-bandwidth-product of the op-amps. find an expression for approximate phase error of the active-compensated amplifier shown in Fig.6

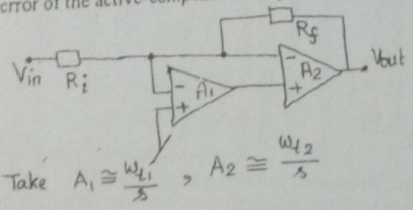


Fig. 6

Take $A_1 \cong \frac{\omega_{t1}}{s}$, $A_2 \cong \frac{\omega_{t2}}{s}$

[7] Explain the function of an op-amp as a comparator, zero crossing detector and Schmitt trigger with the help of suitable diagrams and waveforms.

[8] For the circuit in Fig. 8, determine the impedance realized between ports 1 and 2 of the circuit, assuming non-ideal op-amps with identical gains given by $A \cong \omega_t/s$.

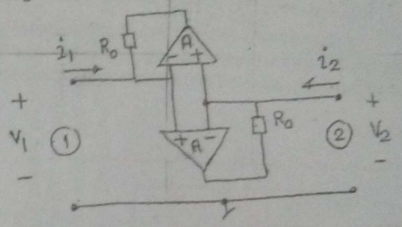


Fig. 8

[9] What are the advantages of *OTA-C* circuits over *op-amp-RC* circuits? Analyze the circuit of Fig.9 and prove that, by proper selection of V_{in1}, V_{in2}, and V_{in3}, one can realize any of the five standard filter functions from this circuit.

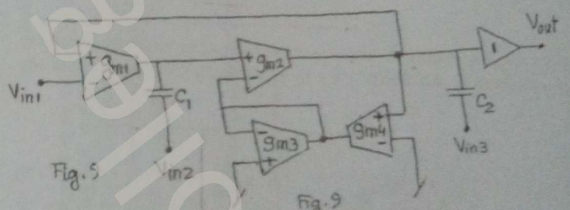


Fig. 5 Fig. 9

[10] *Explain how the terminals A, B and C should be connected to the input V_{in} output V_{out} or among themselves*, so that the log/antilog module shown in Fig.10 can be configured to function as (i) a log amplifier (ii) an antilog amplifier. Draw the configured diagrams for log and antilog operations and prove their validity by relevant mathematical analysis.

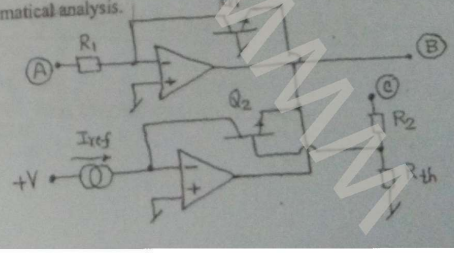


Fig. 10

(62)

Total no of pages : 2

Roll no :.....
BE (COE) Fifth Semester

B.E. END SEMESTER EXAMINATION, NOV 2015
COE - 302 : DMDA (Discrete Mathematics and Design of Algorithms)

Time : 3:00 Hrs.

Max Marks: 70

Note : Attempt any five questions. Assume suitable missing data, if any.

Q.1.(a). Find whether the given formulas are tautology, contingency and contradiction using rules and verify using truth tables.

(i) $\sim(A \rightarrow B) \vee (\sim A \vee (A \wedge B))$

(ii) $(H \rightarrow (I \wedge J)) \rightarrow \sim(H \rightarrow I)$

[4]

Q.1.(b). Show that the set of real numbers between 0 and 1 is not countably infinite set. [5]

Q.1.©. What is a predicate ? How do you define any formula in predicate calculus ? Give suitable examples. [5]

Q.2.(a). State the job sequencing problem with deadlines. Describe the greedy method to obtain an optimal solution to this problem. Find the solution using greedy method when $n = 7$,

$(p1,p2,p3,p4,p5,p6,p7) = (5, 7, 22, 20, 4, 9, 36)$ and
$(d1,d2,d3,d4,d5,d6,d7) = (2,4,5,3,2,3,4)$

[7]

Q.2.(b). What is lexicographic order? Give algorithm to generate permutation in lexicographic order. Generate all the permutations in lexicographic order of 4 objects {6,7,8,9}. [7]

Q.3.(a). Explain the various methods of solving a given recurrence relation. Solve the given recurrence relation when $a_0 = 0$ and $a_1 = 1$

$$a_r - 7a_{r-1} + 10a_{r-2} = 3^r$$

[7]

Q.3.(b). Explain divide and conquer strategy used to solve any given problem. Explain quick sort algorithm. Give suitable example and analyze its complexity. [7]

Q.4.(a). What is a relation? Suppose the relation R on { 1,2,3 } is defined as R = { (1,1), (1,2), (2,1), (2,2), (2,3), (3,2), (3,3)}. Give various representations of this relation. Hence determine whether this relation is equivalence relation or partial ordering relation. [7]

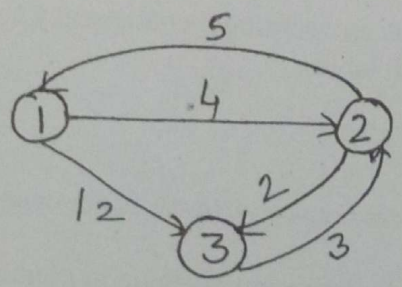
Q.4.(b). Describe the multistage graph problem using forward approach. Give algorithm and apply it on suitable example. [7]

Q.4.(b). Give algorithm for multiplying two matrices using stressen's method . How it is different from conventional matrix multiplication method? Multiply the given matrices using stressen,s method of multiplication.

$$A = \begin{matrix} 2 & 3 & 4 & 1 \\ 1 & 2 & 3 & 2 \\ 4 & 2 & 1 & 1 \\ 3 & 4 & 1 & 2 \end{matrix} \qquad B = \begin{matrix} 2 & 1 & 3 & 1 \\ 1 & 2 & 4 & 5 \\ 3 & 1 & 3 & 2 \\ 2 & 3 & 2 & 3 \end{matrix}$$

[7]

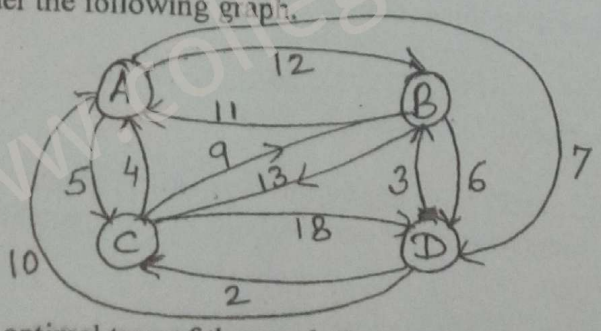
Q.5.(a). Illustrate all pair shortest path algorithm. Apply it on the given graph



[8]

Q.5.(b). Find the optimal placement for 13 programs on three tapes T0, T1, T2 where the programs are lengths 12, 5, 8, 32, 7, 5, 18, 26, 4, 3 11, 10 and 6. [6]

Q.6.(a). Consider the following graph.



Find an optimal tour of the graph that starts at A and goes through the other nodes and terminate at A, using dynamic programming approach. [8]

Q.6.(b).What are Huffman codes? Give algorithm. Also explain it using suitable example. [6]

Q.7. Explain in detail with examples (any four)

(i) Lattice
(ii) Composition of relations and functions
(iii) Characteristic functions and its properties
(iv) Knapsack problem
(v) Asymptotic notations
(vi) Principle CNF and DNF

[3.5 x 4]

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Total No. of Page(s): 2

Roll No.....

FIFTH SEMESTER **B.E. (COE/ECE)**

B.E. END SEM. EXAMINATION, November-2015:

COE/ECE-303 Computer System Organization

Time: 3:00 Hrs. Max. Marks: 70

Note: Question no.1 is compulsory. Attempt any five questions from the rest.
Assume missing data if any

1. [a] What do you mean by Von Newmann architecture? How instruction and data are differentiated in this architecture? Explain with suitable example. (3)
   [b] What is instruction format? Is there any advantage of having instructions in a uniform format? Justify your answer (3)
   [c] Explain the match logic in associative memory. (3)
   [d] What do you mean by prioritizing multiple interrupts? Give example. (3)
   [e] While designing a CPU, how would you decide about addressing modes (i.e. which is to be included or not)? Explain with suitable example. (4)
   [f] Is it necessary to have fetch phase in instruction cycle? Justify your answer. (3)
   [g] Show the hardware to implement the following RTL code:
   i) α : X ← X + Y
   ii) β : X ← X + $\overline{Y}$ +1
   iii) Γ : X ← X ⊕ Y (2)

2. [a] What is bus? What are the various methods to design the bus? Explain one of them. (5)
   [b] In Hardwired control unit design, how synchronization is achieved? Explain. (5)
3. [a] Explain the concept of decoding of an instruction in Micro-programmed control unit. (5)
   [b] While designing a computer system, a input device or output device is required to be connected, Is it interface required to do this? Justify. (5)
4. [a] Design a CPU that meets the following specification:

It can access 256 location of memory, each location store 8 bits. The CPU does this by outputting a 8 bit address on its output pins A[8..0] and reading in the 8-bit value from memory on its input d[7..0]. The CPU contains a 8-bit address register (AR) and program counter (PC); an 8-bit accumulator (AC); and a 8 bit instruction register (IR).

The CPU must realize the following instruction set

Instruction	Instruction code	Operation
COM	00000000	AC ← $\overline{AC}$
JREL	00000001r	AC ← PC + r
ADI	00000010 r	AC ← AC + r
OR	00000011 r	AC ← AC ∨ M[r]

Note: r means 8-bit (10)

5. [a] Draw the flow chart for division of two floating point unsigned numbers. Give the example for the same. (5)
   [b] Write Booth's algorithm. Explain with suitable example. (5)
6. [a] What do you mean by cache performance? A computer system has a cache with access time 10 ns, physical memory with access time 55 ns. What is the hit ratio if average memory access time is 40 ns? (5)
   [b] Show the layout of a cache for a CPU that can address 1M X 16 of a memory; the cache holds 8K X 16 of data and has the following mapping strategies. Give the number of bits per location and the total number of locations.
   i) Fully associative
   ii) Direct mapped
   iii) Two-way set associative
   iv) Four-way set associative (5)
7. [a] Write short notes on the following:
   i) Daisy chaining
   ii) DMA controller
   iii) Serial communication vs. parallel communication
   iv) BCD addition /subtraction
   v) Microinstruction format (2 X 5)

Number of pages.....

Roll Number.....

End Semester examination, November 2015
EC/COE/IC 305
Industrial Organization and Managerial Economics

Time 3:00 Hours **B.E.**
Max. Marks: 70

Instructions: Attempt any FIVE Questions.

Q.1.(A) 'Decisions in business should not be based on guesses, rather on a careful analysis of data concerning the future course of events'. Explain the significance of the above statement. Discuss four important methods used in the forecasting process.....(8)

Q.1.(B) A small plant manufactures a product which is sold for Rs. 10.50 per unit. The fixed cost of the assets is Rs. 50000 at variable cost of R. 6.50 per unit. How many units should be produced to break even? How many units must be produced to earn a profit of Rs. 10000? .....(6)

Q.2. (A). Explain four important advantages of time study. Define cycle time, normal time, standard time, allowance.....(8)

Q.2.(B). Explain various charts used as a tool of motion study. .....(6)

Q.3. (A) Why is employee motivation an important concept in managing an organization? Explain with the help of any two theories of motivation.....(8)

Q.3.(B) Morale is recognized as one of the major factors affecting productivity. Explain the concept and the factors which tend to lower or improve the employee morale.....(6)

Q.4. Discuss the importance and characteristics of managerial decision making process. Explain the important types of decisions with suitable examples.....(14)

Q.5.(A) What are the main objectives of inventory control? How are inventories classified?..... (8)

Q.5.(B) Find the economic batch quantity using the data given below:
Set up cost = Rs 20 per set up
Annual requirements or yearly consumption of parts=1000
Inventory carrying cost=10% of value/year
Cost per part= Rs. 2 .....(6)

Activity	Most Optimistic Time	Most Pessimistic Time	Most Likely Time
1-2	5	10	8
1-3	18	22	20
1-4	26	40	33
2-5	16	20	18
2-6	15	25	20
3-6	6	12	9
4-7	7	12	10
5-7	7	9	8
6-7	3	5	4

Construct the network. Determine its critical time, latest start time, latest finish time, total and independent float.

Note: Q. 1 is compulsory. Attempt any FOUR questions from Q.2 to 7. Assume missing data (if any).

1.

a. Find out the aspect ratio of the raster system using 8 X 10 inches screen and 100 pixels per inch.

b. Let a =2i – j + k and b=3i + 4j - k be two vectors and θ be the angle between them. Find the value of sin θ.

c. What is the need for homogeneous coordinates in geometric transformations?

d. How DDA differs from Bresenham's line drawing algorithm?

e. Show that the 2 X 2 matrix below represents pure rotation (360°).

$$[T] = \begin{bmatrix} \frac{1-t^2}{1+t^2} & \frac{2t}{1+t^2} \\ \frac{-2t}{1+t^2} & \frac{1-t^2}{1+t^2} \end{bmatrix}$$

f. What are interpolating and approximating curves?

g. What is the convex hull property of Bezier curves? [7x2=14]

2.

a. A clipping window is specified as A(0, 0), B(40,0), C(40,40) and D(0,40). A line segment joining the points are P(-10,20) and Q(50,10). Find the visible portion of the line segment by applying following methods:

i. Midpoint subdivision algorithm.

ii. Cyrus Beck algorithm.

b. Derive a transformation A which aligns a given vector (V=ai + bj +