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FIFTH SEMESTER B.E. (COE)

B.E. END SEM. EXAMINATION, Nov-Dec. 2008

COE-301 : Principles of Computer Graphics

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

Note: *Question No.1 is compulsory.*
Answer any four questions from the rest.
Assume suitable missing data, if any.

1.

[a] Define the terms:
Refresh rate, Video memory, Interlacing and video controller. [2]

[b] Define the data structure if scan line polygon fill algorithm, traverse the scan line vertically and give example to generate a Global Edge Table. [3]

[c] Discuss about Weighted Area Sampling Method for anti aliasing. [3]

[d] Give comparision of Raster Scan and Random-Vector displays. [3]

[e] Give in brief mechanism of Beam Penetration CRT and shadow-mask CRT. [3]

2.

[a] Using Mid-Point scan conversion algorithm, scan convert the line with end points (5,8) and (9,11). Perform:
i) if it is Traversed from (5,8) to (9,11)
ii) if it is Traversed from (9,11) to (5,8)
Depict the difference in digitization, if any. [7]

[b] Digitize a dashed circle with centre at (5,5) and radius equal to 17 units. The dash length is of 2 unit. Use Bresenham's 2nd order Algorithm to digitize it. [7]

3.

[a] Write the steps for clipping the subject polygon against a clip polygon (window), if the subject polygon is a dash polygon use the Sutherland Hodgman which can clip the given (dash) subject polygon. What changes needed in the algorithm to incorporate such clipping. Trace any example in support. [8]

[b] Use Cyrus-Beck line-clipping algorithm, clip the line $P_0(-7,-14)$ to $P_1(20,40)$ against the window having diagonally opposite corners as (0,0) and (15,15). [6]

4.

[a] What are homogeneous coordinates? Map a triangle ABC [A(100,100), B(200,200), C(500,300)] displayed on a screen with resolution 640×480 to a screen whose resolution is 1280×1024. [2+5]

[b] Consider the object given in Fig.-1, rotate the object (Pyramid) ABCDE with respect to x-axis with angle 90^0 in anticlockwise direction. Find the coordinates of new object.

Given:

A (2, 0, –2)
B (4, 0, –2)
C (4, 0, 2)
D (2, 0, 2)
E (0, 4, 0).

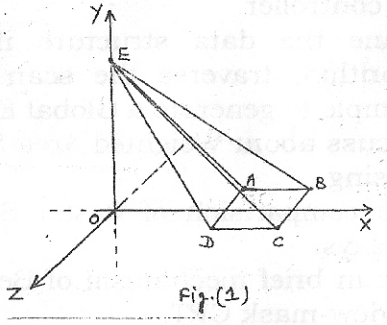

Fig.-(1)

[7]

5.

[a] Determine the projected image on to the xy-plane of a tetrahedron ABCD:

$$ABCD = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \end{bmatrix}$$

Using the standard single point perspective transformation. The distance of the vanishing point P from the view plane is 5 units. [4]

[b] Derive the general parallel projection matrix for projection on to a view plane defined by normal vector $\vec{N} = 3\hat{i} - 2\hat{j} + 4\hat{k}$ and reference point $R_0(6,4,3)$ in the direction of a given projector $\vec{V} = \hat{i} - \hat{j} + \hat{k}$. [6]

[c] Find the transformation for cabinet projection with $\theta = 30^0$. Draw the projection of the unit cube for the same transformation. [4]

6.

[a] Given two triangles:

Triangle 1: $T_{11}(0,7,5)$, $T_{12}(6,7,5)$, $T_{13}(0,1,5)$
Triangle 2: $T_{21}(0,6,7)$, $T_{22}(0,1,2)$, $T_{23}(5,1,7)$

Use Area Subdivision algorithm for hidden surface removal to traverse the given triangle. [8]

[b] What is 3D-viewing? Give an example explaining the steps taken for 3D-viewing. [6]

7.

[a] Four Control Points $P_0(a,b)$, $P_1(2,5)$, $P_2(4,4)$ and $P_3(7,C)$ are available for drawing a periodic cubic B-Spline Curve Segment. Compute the values of a, b and c such that the curve starts from the point (2.1, 4.3) and terminates with slope –0.5. [5]

[b] Discuss Beizer Surfaces. Explain in brief their design properties. [6]

[c] What is Wire frame model? Give its advantages and disadvantages. [3]

8. Write short notes **on any four** of the following:

[a] Phong Model
[b] Recursive Ray Traces
[c] Animation Techniques
[d] Comparision of Phong & Gourand Shading Model
[e] Specular Reflection
[f] LCD Display. [3.5×4]

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Total No. of Pages 3 Roll No._____

FIFTH SEMESTER BE(COE)

END SEMESTER EXAMINATION, November 2008
COE 302: DISCRETE MATHEMATICS & DESIGN OF ALGORITHMS

Time: 3 Hrs Max Marks:70

Note: Attempt any FIVE Questions
Assume suitable missing data, if any.

Q.1 a.) Using predicate calculus show that the premises that "Every one in the college has purchased a computer" and "Hari is a student in this college" implys the conclusion "Hari has purchased a computer".

[6]

b.) Obtain the principle DNF and CNF of (P->(Q∧R)) ∧ (~P->(~Q∧~R)) using rules.

[8]

Q.2 a.) Among the integers 1-300, how many of them are not divisible by 3, nor by 5, nor by 7?How many of them are divisible by 3 but nor by 5, nor by 7?

[4]

b.) What is recursion? Solve the recurrence relation

$$a_n+5a_{n-1}+6a_{n-2}= 3n^2-2n+1$$

[6]

c.) Prove that among 100,000 people there are two who were born at exactly the same time (hrs, mins, secs).

[4]

Q.3 a.) What is difference between permutation and combination? What is lexicographic order? Determine the number of ways to adjust five boys in a row of 12 chairs.

[5]

b.) Prove that the set of natural numbers is in one-to-one correspondence with the set of symbols of the form 'c1c2.....cn' , where n=1,2,3.....∈ {a,b}

[4]

c.) Let {A1,A2,....Ak} be a partition of a set A. We define a binary relation R on A such that an ordered pair (a,b) is in R if and only if a and b are in the same block of the partition. Show that R is also an equivalence relation.

[5]

Q.4 a.) Consider the recurrence and find its asymptotic bound.

$$T(n)= 14T(n/2)+n^2$$

[3]

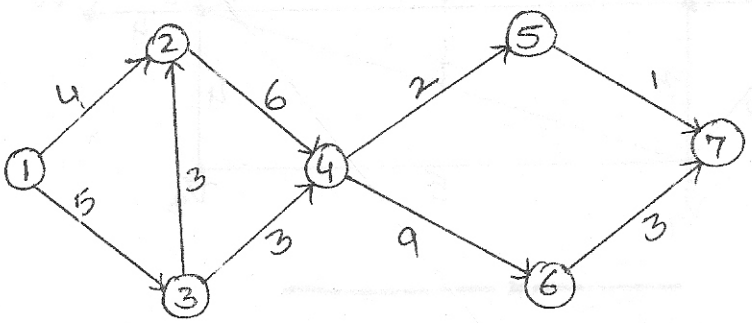
b.) Write a recursive algorithm /C code for finding maximum and minimum element from a list of numbers. Also find the complexity of this algorithm.

[7]

c.) Apply divide and conquer strategy for finding coin with max weight among collection of coins. How many minimum number of comparisons are required if there are 8 coins.

[4]

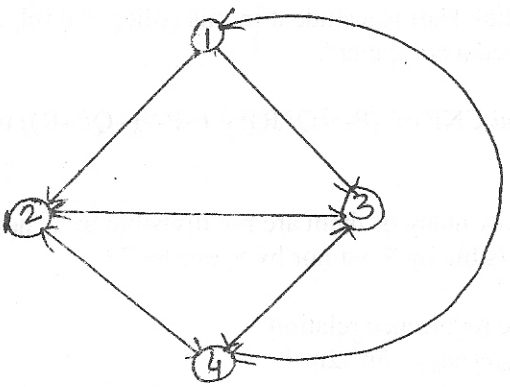
Q.5 a.) Apply all pair shortest path algorithm on the given graph below



b.) Discuss knapsack problem. Consider the 0-1 knapsack instance for n = 4 , weight set is (w1,w2, w3,w4) = (2, 11, 22, 15) and profit set is (p1,p2,p3,p4) = (11,21,31,33) and m = 40. Find the optimal solution.

[7]

Q.6 a.) State traveling salesman problem. Consider a directed graph given below and find the optimal tour.



$$\begin{bmatrix} 0 & 10 & 8 & 12 \\ 15 & 0 & 4 & 7 \\ 6 & 20 & 0 & 3 \\ 9 & 8 & 10 & 0 \end{bmatrix}$$

[7]

b.) What are prefix code? Where are they used? Write an algorithm for constructing Huffman code for the following alphabets and their relative probabilities.

Character	x	a	b	c	d
Frequency	40	18	12	16	14

OR

Analyze a multistage graph problem. Explain the forward and backward approaches for solving any problem with the help of example. Write the algorithm for both the approaches.

[7]

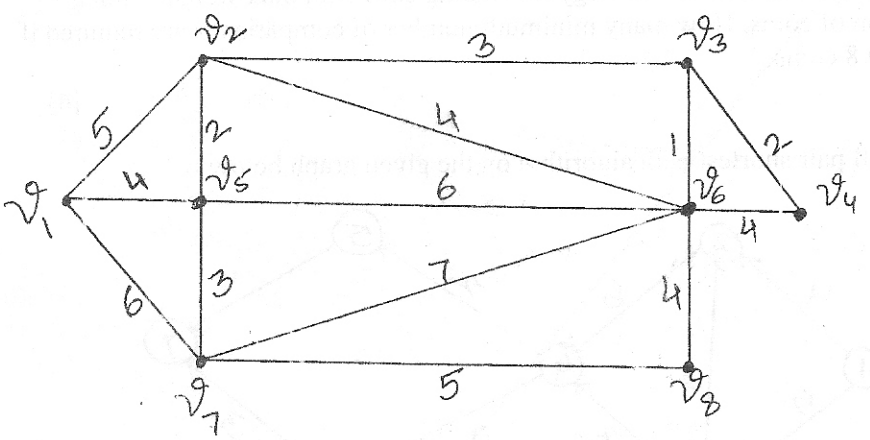
Q.7 a.). Determine the Longest Common Subsequence of (A,B,C,D,B,A,C,D,F) and (C,B,A,F).

OR

Compute the overall computing time T(n) of stressen's matrix multiplication.

[4]

b). What is the difference between Greedy and Dynamic programming methods? What are minimum spanning trees? Write the C/C++ code for Prims and Kruskals methods. Apply both these methods on the given graph.



[10]

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END SEMESTER EXAMINATION, NOVEMBER 2008
V SEMESTER BE (COE)

COE-303 **Computer System Organization**
Time: 3 Hrs. **Max. Marks: 70**

Note:

- *Attempt any five out of seven questions.*
- *Assume missing data suitably, if any.*

1a. How many passes are required for an assembler? Justify your answer. Draw the flowchart for the assembler which will generate the machine code. 8

b. List the assembly language program (of the equivalent binary instructions) generated by a compiler for the following IF and FOR loop statements:

(i) if(A-B)10, 20, 30

(ii)
```
int X[10], sum;
sum=0;
for (i=0; i<10; i++)
    sum=sum+X(i);
end
```

The program branches to statement 10 if A is less than B; to statement 20 if A equals B; and to statement 30 if A is greater than B. 6

2a. How many times does the control unit refer to the memory when it fetches and executes an indirect addressing mode instruction if the instruction is (i) a computational type requiring an operand from memory, (ii) a branch type. 4

b. Discuss the hardware for $xyT_0+T_1+y'T_2$: AR $\leftarrow$ AR+1. Include logic gates for control functions and a block diagram for binary counter with a count enable input. 4

c. A computer based on the relatively simple CPU contains a 16 word associative cache with FIFO replacement policy. Show the contents of the cache during and after the execution of the following code. Also give the hit ratio for this program on this system. 6

```
0 :     LDAC 4234
3 :     STAC 4235
6 :     MVAC
7 :     INAC
8 :     ADD
9 :     JPNZ 0020
C :     JUMP 0010
F :     NOP
10:     CLAC
11:     JUMP 0020
20:     LDAC 4235
23:     JUMP 0029
26:     JUMP 0000
29:     AND
4235:   55
```

3a. List the advantages and disadvantages of microprogrammed control and hardwired control. 5

b. Discuss microprogram sequencer with block diagram. 6

c. Write various instruction formats and explain importance of each of them. 3

4a. Discuss and illustrate the Booth's algorithm with block diagram for multiplications of signed-2's complement numbers. 5

b. Explain the division of floating point numbers showing (complete) block diagram. 9

5a. Why does the same size of RAM have less memory storage as compare to ROM? Use suitable block diagram to connect CPU with memory. 5

b. What is the difference between random access memory and associative memory? Describe the match logic for associative memory. 7

c. What do you mean by memory hierarchy? Why do you need it? 2

6a. What is mapping processing in context of memory? Discuss different types of mappings. 6

b. A cache miss results in memory access followed by replacement of an existing cache block by the newly brought in cache block. If the old block is dirty (not valid data), a cache write-back also takes place. Assume that the cache is always full and so replacement is inevitable. With a hit ratio of 90%, a 60% probability of replaced cache blocks being dirty, a memory access time of 900ns and a cache access time of 100 ns, calculate the average memory access time. 4

c. Discuss asynchronous and synchronous data transfer briefly. 4

OR

Discuss direct memory access.

7. Write short notes on any *four* of the following: 4x3.5

(i) BCD arithmetic
(ii) RISC and CISC
(iii) Addressing modes
(iv) Priority Interrupts
(v) Bus organization

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Vth Sem. BE (ECE/COE/ICE)

ECE/COE/ICE-304: Linear Integrated Circuits

Time: 3Hrs | Max. Marks:70

Note: Attempt any ten questions. All questions carry equal marks. Missing data, if any, may be suitably assumed and should be mentioned in the answer. Assume ideal op-amps, unless specified otherwise. Be concise and use space judiciously. Wastage of paper and use of supplementary answer books is strongly discouraged.

1. Using the exponential relation between V_{be} and I_C, derive an expression for the current I_0, assuming matched transistors with negligible base currents. (Fig.1)
2. Show that the circuit of Fig.2 can function as an inductor. Find the value of the equivalent inductance and draw its equivalent circuit.
3. Determine the type of filter the circuit of Fig.3 realises. Assume $A_1=\omega_{11}/s$ and $A_2=\omega_{12}/s$
4. Analyze the circuit of Fig.4 and hence prove or disprove 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.
5. Write down the transfer functions of second order low-pass, band pass, high pass, band stop and all pass filters. Analyze the circuit of Fig.5 and determine which of the five standard filters quoted above are realizable by this circuit. Determine the expressions for gain, bandwidth, Q and angular frequency ω_0 for the filters realized by this circuit.
6. Why do we not use differentiators to make filters? Find the expression for the frequency response of the differentiator shown in Fig.6 If $A_v=\omega_t/s$, find up to what frequency range this circuit acts as differentiator.
7. Assuming ideal op-amps, determine the condition under which the circuit of Fig.7 can generate sinusoidal oscillations. Determine the expression for the oscillation frequency.
8. Determine whether or not the OTA circuit of Fig.8 is a sinusoidal oscillator? If not how you can modify this circuit to realise an OTA-C oscillator? Find out the condition of oscillation and frequency of oscillation.
9. Show that with ideal op-amps the circuit of Fig.9 realises a unity gain voltage follower. With $A_1=A_2=\omega_t/s$ determine the phase error of the circuit.
10. By appropriate analysis, determine the function performed by the circuit shown in Fig.10
11. Consider the astable multivibrator of Fig.11 Where the resistor R_p denotes the losses of the capacitor C. By analysis determine in what way the time period of the square wave generated by this circuit is affected by the resistor R_p.
12. One method for achieving equal high and low intervals for the IC555 timer in astable multivibrator mode is shown in Fig.12. Show that for symmetrical conditions (i.e. two intervals being equal), the time period T is given by $T=1.39R_BC$.
13. What is the difference between 2-quadrant and 4-quadrant multiplier? Analyze the circuit of Fig.13 and determine the condition under which the input resistance R_{in} is inversely proportional to control voltage V_C.
14. Write short notes on any two of the following
    a. Applications of PLL
    b. Gilbert multiplier
    c. Voltage-controlled oscillators
    d. Current-mirror as active-load

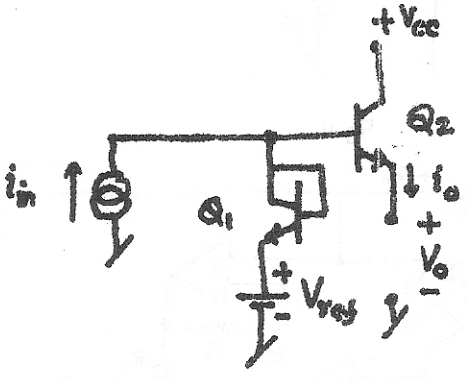

Fig. 1

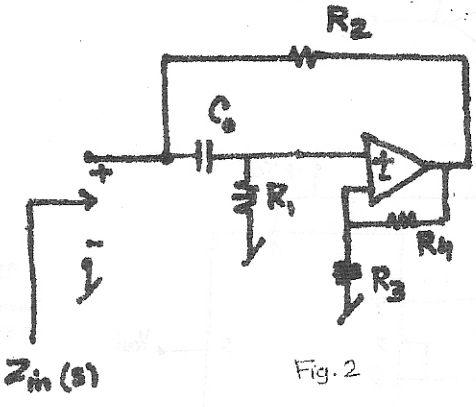

Fig. 2

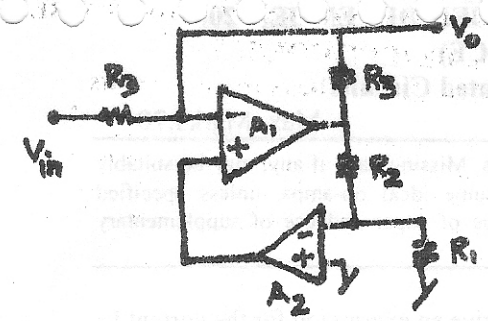

Fig. 3

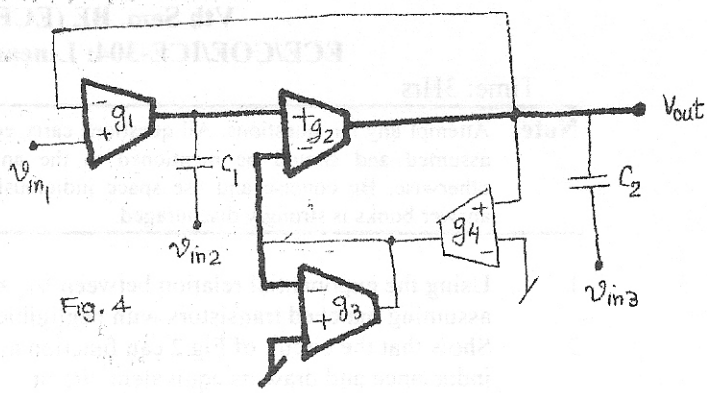

Fig. 4

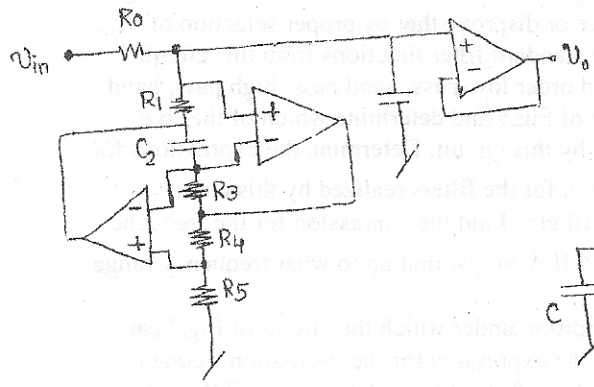

Fig. 5

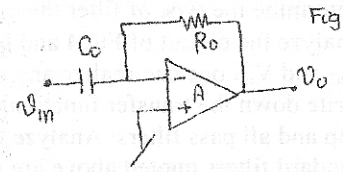

Fig. 6

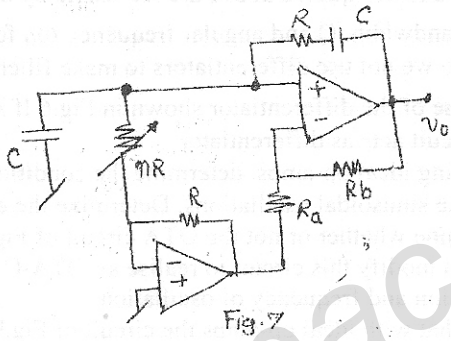

Fig. 7

where

$A \cong \frac{\omega_t}{s}$, for $\omega \gg \omega_p$

$\omega_t = A_0 \omega_p$

symbols have their usual meaning.

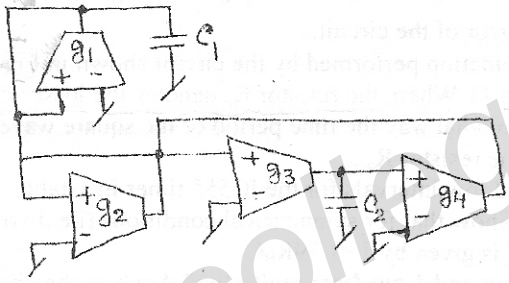

Fig. 8

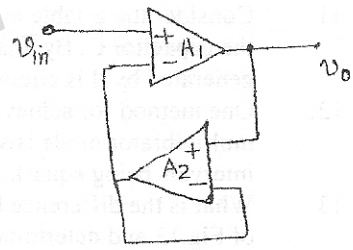

Fig. 9

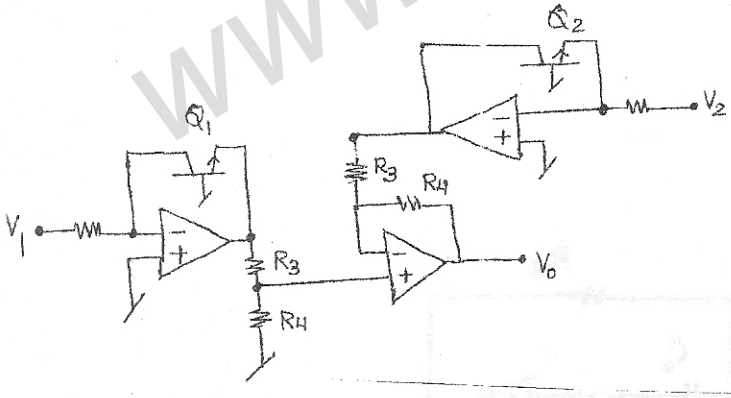

Fig. 10

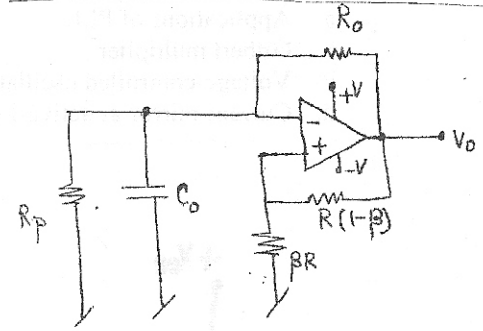

Fig. 11

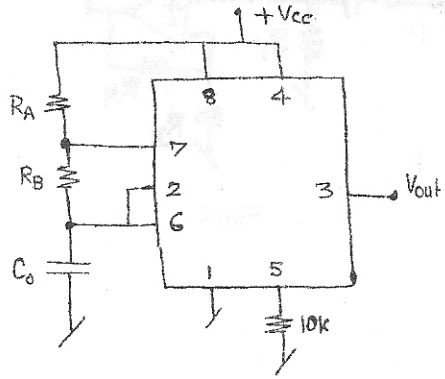

Fig. 12

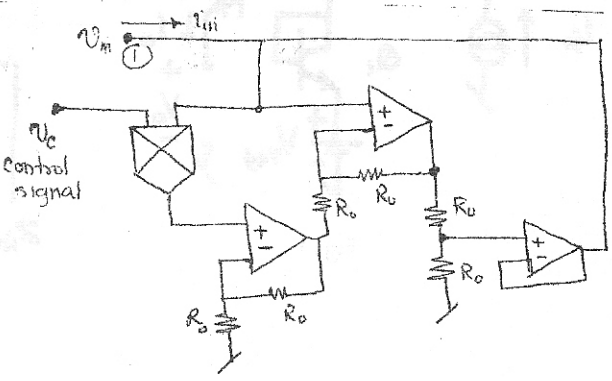

Fig. 13

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FIFTH SEMESTER **B.E. (COE/EC/EE/IC)**

END SEM EXAMINATION ***NOV./DEC.-2008***

COE/EC/EE/IC-305 INDUSTRIAL ORGANISATION AND MANAGERIAL ECONOMICS

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

Note : Answer any ***FIVE*** questions.
Assume suitable missing data, if any.

1[a] Define organization. How is organization chart useful in management? Discuss different principles of sound organization. 7

[b] Differentiate among the following structures of organization
(i) Line type structure
(ii) Line and staff structure
(iii) Functional structure. 7

2[a] What are the factors considered for plant location? Illustrate with a case study on steel plant. 7

[b] What are the objectives of a good plant layout? Explain the advantages and limitations of product layout and cellular layout. 7

3[a] Discuss assumptions made in breakeven analysis. Define and explain the following in the context of break even analysis.
(i) Break even point
(ii) Safety margin
(iii) Angle of incidence. 7

[b] A manufacturing firm has three proposals for a product. Either it can be purchased from an outside vender at Rs.400 per unit or it can be manufactured in plant. There are two alternatives for in plant manufacturing. Either a fully automatic unit is procured, involving fixed cost of Rs.30,000 and variable cost of Rs. 2.75 per unit. Alternatively, a semi automatic unit would cost Rs. 20,000 as fixed cost and Rs. 3.00 per unit as variable cost Draw a break even chart for these alternatives. Suggest range of production volume suited for these alternatives. 7

4[a] What are objectives of production planning and control? Discuss different steps followed in PPC. 7

[b] Define different Johnson's Rule for optimal sequence of N jobs on 2 machines. Following these rules, schedule five jobs on three machines (Table-I). Also find idle time for all the machines.

Table-I

Job	Processing Time		
	M/c A	M/c B	M/c C
1	6	2	4
2	9	3	2
3	10	5	1
4	12	6	3
5	8	2	2

7

5[a] Differentiate between CPM and PERT and write the objectives of these methods. Define following time estimate in PERT –

(i) Optimistic time
(ii) Pessimistic time
(iii) Most likely time
(iv) Expected time. 7

[b] The precedence relationship for nine activities is given below. Find critical path and slack for different activities.

Activity	A	B	C	D	E	F	G	H	I
Duration	9	9	10	4	7	3	8	7	0
Precendence	--	--	--	A	B	C	D,E,F	C	G,H

7

6[a] Define different steps followed in work study. Explain following types of charts used in work study.

(i) Man and machine chart
(ii) Flow process chart
(iii) Flow diagram and
(iv) SIMO chat. 7

[b] State principles of motion economy. Give five examples of Therbligs and their uses. 7

7[a] Define performance rating. In a time study for a Job done by a worker whose rating is 90, the data are as follows:

Observed time = 20 minutes.
Personal need allowance = 40% of Basic time
Fatigue allowance = 2.5% of Basic time
Contigency work allowance = 2% of Basic time
Contigency delay allowance = 1% of Basic time
Find
(i) Basic time (ii) Work content
(iii)Standard time. 7

[b] Distinguish between moving average and exponential smoothing methods of forecasting. The demand for the disposable plastic tubing for a general hospital is 300 units and 350 units for September and October respectively. Using 200 units as forecast for September, compute the forecast for the month of November. Assume the value of smoothing constant (α) as 0.7. 7

8 Write short notes on any THREE:

[a] Methods of Job evaluation
[b] Stages of Production
[c] Personnel management
[d] Profit and capital management. 14