

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
 TEST -3 EXAMINATION- 2024

B.Tech-VI Semester (CSE & ECM)

COURSE CODE(CREDITS): 18B11CI612 (3)

MAX. MARKS: 35

COURSE NAME: COMPILER DESIGN

COURSE INSTRUCTORS: Pardeep, Maneet, Faisal, Ramesh

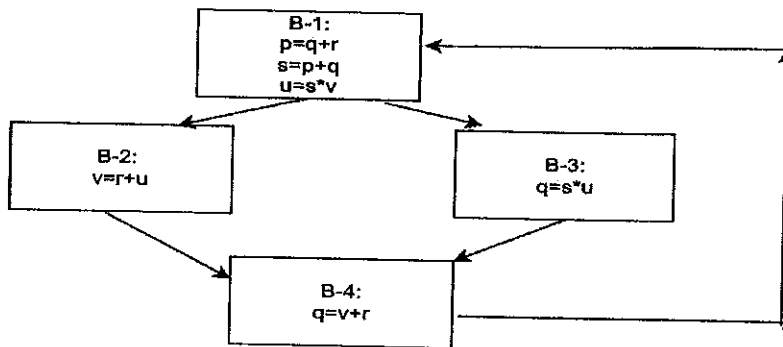
MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

1. Consider the following control flow graph. Do the liveness analysis and find out the mutually exclusive live variables in blocks B-2 and B-3:



[CO-5] [7]

2. Consider the intermediate code segment given as under:

$i=1; j=1; t1=10*j; t2=t1+j; t3=8*t2; t4=t3-88; a[t4]=0.0; j=j+1; \text{if } j \leq 10 \text{ goto } (3);$
 $i=i+1; \text{if } i \leq 10 \text{ goto } (2); j=1; t5=i-1; t6=88*t5; a[t6]=1.0; i=i+1; \text{if } i < 10 \text{ goto } (13)$

Construct the control flow graph having basic blocks to recognise loops in the intermediate code.

[CO-6] [7]

3. Consider the given below syntax directed translation and execute the arithmetic expression $4 \& 8 @ 5 \& 7 @ 3$ using bottom up and top down parsing.

$E \rightarrow E \& T \{ E.value = E.value * T.value \} | T \{ E.value = T.value \}, T \rightarrow T @ F \{ T.value = T.value - F.value \} | F \{ T.value = F.value \}, F \rightarrow \text{num} \{ F.value = \text{num} \}$

[CO-5] [7]

4. Consider the code segment: `for (i=0; i<n; i++) { for (j=0; j<n; j++) { if (i%2) { x+=4*j + 5*i; y+= (7+4*j); } } }` Do the peephole optimization including frequency reduction/loop invariant computation, common sub-expression elimination, strength reduction and dead code elimination. Show your resultant code after every kind of peephole optimization.

[CO-6] [7]

5. Consider the arithmetic instruction $-(a+b)*(c-d)$. How many address code instruction is this? Write the corresponding 3-address code of this expression. Make the Quadruples and Triples of this expression and compare in terms of space and time complexity.

[CO-6] [7]