

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [BATCH 2016-19]

B.A./B.Sc. FOURTH SEMESTER (January – June) 2018

Mid-Semester Examination, March 2018

COMPUTER SCIENCE (Honours)

Date : 14/03/2018

Time : 2 pm – 4 pm

Paper : IV

Full Marks : 50

[Use a separate Answer Book for each group]

Group – A

(Answer any four questions)

[4×5]

1. Explain Bakery algorithm for solution to the critical section problem for n number of processes and show how it achieves mutual exclusion when any two processes request to enter their critical sections at same time. [3+2]
2. Consider the following set of processes that need to be scheduled on a single CPU. All the times are given in milliseconds.

Process Name	Arrival Time	CPU Execution Time
P1	0	5
P2	1	7
P3	3	4

Calculate average waiting time for these processes using Round Robin algorithm with time slice = 2 millisecond. [5]

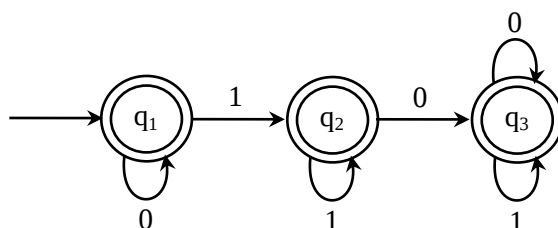
3. Explain the internal details of exit() system call. [5]
4. a) What is the advantage of Inter Process Communication (IPC)? [2]
b) Differentiate between shared memory and message passing. [2]
c) What is involuntary process termination? [1]
5. a) Differentiate between CPU-bound process and I/O-bound process with example. [2]
b) Explain multilevel feedback queue scheduling. [3]
6. Explain how hardware interrupt is handled by operating system. [5]

Group – B

(Answer any three questions)

[3×5]

7. a) Define inherent ambiguity of a CFG. [2]
b) Give the CFG for palindrome. [3]
8. a) State and prove Arden's theorem. [3]
b) Find out regular expression for the following transition diagram. [2]



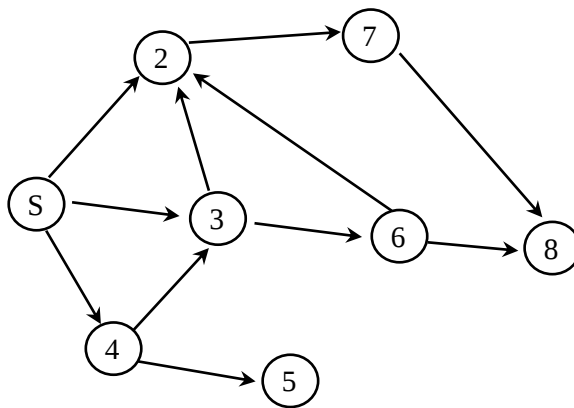
9. a) Convert the following grammar into C.N.F. [2·5]
 $S \rightarrow bA \mid aB$
 $A \rightarrow bAA \mid aS \mid a$
 $B \rightarrow aBB \mid b$
- b) Convert the following grammar into G.N.F. [2·5]
 $S \rightarrow ABb \mid a$
 $A \rightarrow aaA \mid B$
 $B \rightarrow bAb$
10. a) Construct an NFA that accepts the language $\{01, 012^*\}$ [2·5]
b) Define Mealy and Moore machine. [1+1]
c) Define regular language. [0·5]

Group – C

(Answer any three questions)

[3×5]

11. Write down the Euclidean GCD algorithm and compare its complexity with factoring GCD calculation method for two numbers. [5]
12. a) What do you mean by validation of an algorithm. [2]
b) Prove or disprove : $T(n) = \Theta(T(n))$. [3]
13. a) If $f(n) = a_m n^m + \dots + a_1 n + a_0$ then prove that $f(n)$ is in $O(n^m)$. [3]
b) Show that $10n^2 + 9$ is not in $O(n)$. [2]
14. a) Perform BFS and DFS of the following graph :



S denotes source vertex. [3]

- b) Explain differences between fractional Knapsack and 0/1 Knapsack problem. [2]

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