

King Fahd University of Petroleum and Minerals
 College of Computer Sciences and Engineering
 Department of Computer Engineering

COE 444 – Internetwork Design and Management (T092)

Homework # 04 (due date & time: Sunday 23/05/2010 during class period)

***** Show all your work. No credit will be given if work is not shown! *****

Problem # 1 (60 points): A network has three backbone switches B_1 , B_2 , and B_3 that are interconnected with full duplex links according to a tree topology with B_1 as the root of the tree, and B_2 and B_3 as the children of B_1 . Suppose that there are 6 workgroup switches, labelled S_1 to S_6 , that are assigned as follows: S_1 and S_2 to B_1 , S_3 and S_4 to B_2 , and S_5 and S_6 to B_3 . Assume that the MTBF and MTTR of any link are respectively 8 years and 1 day, and the MTBF and MTTR of any switch are respectively 12 years and 3 days. (1 year = 365.25 days)

- a. (10 points) Find P_l and P_s , the links and switches reliabilities (use precision at 10^{-5})
- b. (10 points) Find the overall network reliability, that is, the probability that the network is connected.
- c. (20 points) Find $E(B_1)$, the expected number of nodes communicating with the root node B_1 .
- d. (20 points) Find $EPR(B_1)$, the expected number of node pairs communicating through the root node B_1 .

Problem # 2 (40 points): Calculate the reliability of the path from router **A** to router **F** of the following network given the associated links reliabilities. Assume that the reliability of each router is 100%. (*Note: Show all steps of your calculation*)

