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SG

Computer Engineering Department

B.Tech.2nd Year, Semester: 3rd

Digital Circuits

Mid Semester Exam- Sept 2011

Time: 1 Hour

Max. Marks: 30

Note: All Questions are Compulsory.

Design the circuits neatly wherever required.

Sufficient datas have been provided, if required assume by your side.

- Q.1** Determine which of the following equations are valid (give proof) (04)
- a) $A'B+B'C+C'A=AB'+BC'+CA'$
 - b) $(A+B)(B+C)(C+A)=(A'+B')(B'+C')(C'+A')$
 - c) $ABC+AB'C'+B'CD+BC'D+AD=ABC+AB'C'+B'CD+BC'D$
 - d) $XY'+X'Z+YZ'=X'Y+XZ'+Y'Z$
- Q.2** For each of the following functions find minimum SOP solution using QUINE Mc-CLUSKEY method: (05)
- $f(a,b,c,d,e)=\sum m(0,2,3,5,7,9,11,13,14,16,18,24,26,28,30)$
- Q.3** Draw a circuit for the function: $F=ABC+A'BC+AB'C+ABC'$ (03)
- a) using one OR gate & three AND gates. The AND gate should have two inputs.
 - b) using two OR gates & two AND gates. All of the gates should have two inputs.
- Q.4** A Flow rate Sensing device used on a liquid transport pipeline functions as follows. The device provides a 5-bit output where all five bits are zero if the flow rate is less than 10 gallons per minute. The first bit is 1 if the flow rate is at least 10 gallons per minute; the first and second bits are 1 if the flow rate is at least 20 gallons per minute; the first, second and third bits are 1 if the flow rate is at least 30 gallons per minute and so on. The five bits represented by logic variables A, B, C, D and E are used as inputs to a device that provides two outputs Y and Z. (04)
- a) Write an equation for the output Y if we want Y to be 1 iff the flow rate is less than 30 gallons per minute.
 - b) Write an equation for the output Z if we want Z to be 1 iff the flow rate is at least 20 gallons per minute but less than 50 gallons per minute.
- K-Map is required for the mentioned problem.
- Q.5** simplify each of the following expression one of the theorems and state theorem used. (04)
- a) $(X+Y'Z)(X+Y'Z)'$
 - b) $(W+X'+YZ)(W'+X'+YZ)$
 - c) $(V'W+X)'(V'W+X+Y+Z)$
 - d) $(V'+W'X)(V'+W'X+Y'Z)$
 - e) $(W'+X)YZ'+(W'+X)'YZ'$
 - f) $(V'+U+W)(WX+Y+UZ')+(WX+Y+UZ')$
 - g) $[AB'+(CD)'+E'F]CD$
 - h) $(A'+BC)(D'E+F)+D'E+F$