Visvesvaraya Technological University, Belagavi MODEL QUESTION PAPER 5th Semester, B.E (CBCS) EC/TC

Course: 15EC552 - Switching & Finite Automata Theory

- Note: (i) Answer Five full questions selecting any one full question from each Module.
 - (ii) Question on a topic of a Module may appear in either its 1st or 2nd question.

Time:3 Hrs

Max. Marks:80

| MODULE - 1 | | | | | | | | | |
|--|---|---|---|--|--|--|--|--|--|
| 1 | a. | Explain the concept of Threshold Logic. | | | | | | | |
| | b. | Discuss the following: | 6 | | | | | | |
| | (i) Elementary Properties (ii) Unate Function | | | | | | | | |
| | c. | Determine which of the functions is Unate. Show its minimal | 4 | | | | | | |
| | form. | | | | | | | | |
| (i) $f(x_1, x_2, x_3, x_4) = \sum (1, 2, 3, 8, 9, 10, 11, 12, 14)$ | | | | | | | | | |
| | | (ii) $f(x_1, x_2, x_3, x_4) = \sum (2,3,6,10,11,12,14,15)$ | | | | | | | |
| OR | | | | | | | | | |
| 2 | a. | Given the switching function $f(x1, x2, x3, x4) = \sum (2, 3, 6, 7, 10, 3)$ | 8 | | | | | | |
| | 12, 14, 15). Find a minimal threshold logic realization. | | | | | | | | |
| b. Show that threshold logic realization of Full Adder require | | | | | | | | | |
| | | two threshold elements.(Note that both sum and carry must be | | | | | | | |
| | | generated) | | | | | | | |
| MODULE - 2 | | | | | | | | | |
| 3 | a. | Use the map method to find a minimal set of tests for multiple | 8 | | | | | | |
| | faults for the two-level AND – OR realization of the function | | | | | | | | |
| | f(w, x, y, z) = wz' + xy' + w'x + wx'y | | | | | | | | |
| | Explain the basic principle of one dimensional path sensitization | 6 | | | | | | | |
| | | method. | | | | | | | |
| | с. | Define (i) Hazards (ii) Fault Table | 2 | | | | | | |
| | | OR | - | | | | | | |
| 4 | a. | Discuss the following: | 8 | | | | | | |
| | | (i) Possible strategies in Fault Tolerant Design (ii) Restoring | | | | | | | |
| | _ | Organs | | | | | | | |
| | b. | List the properties of Boolean Differences. | 4 | | | | | | |
| | c. | Write a note on Preset Experiments. | 4 | | | | | | |
| MODULE - 3 | | | | | | | | | |

| 5 | a. | Find the minimal form of machine M shown in Table Q.5(a). Also | | | | | | |
|---|----|--|--------|-------------|---------|---------|---------------------|----|
| | | find the isomorphic mach | ine a | and de | educe | its sta | ndard form. | |
| | | _ | Ta | ble Q. | 5(a) | | | |
| | | | PS | NS | , Z | | | |
| | | | | X=0 | X=1 | | | |
| | | | А | Е,О | C,0 | | | |
| | | | В | C,0 | A,0 | | | |
| | | | С | В,0 | G,0 | | | |
| | | | D | G,0 | A,0 | | | |
| | | | Е | F,1 | В,0 | | | |
| | | | F | Е,0 | D,0 | | | |
| | | | G | D,0 | G,0 | | | |
| | b. | Define the following: | • | • | | • | | 6 |
| | | (i) Synchronous Sequent | ial I | Machi | ne (ii) | Equiv | valent States (iii) | |
| | | Compatible States (iv) | Clos | sed S | tate | & Clo | osed Covering (v) | |
| | | Compatibility Graph (vi) | Merg | ger Tal | ble | | | |
| | OR | | | | | | | |
| 6 | a. | What is Merger Grap | ph? | Drav | v the | e Me | rger Graph and | 10 |
| | | corresponding compatibil | lity g | graph | for th | le inco | ompletely specified | |
| | | machine M shown in Tab | le Q. | 6(a). | | | | |
| | | | Ta | ble Q. | б(а) | | | |
| | | PS | NS, | Z | | | | |
| | | | I1 | I2 | I3 | I4 | | |
| | | Α | - | C,1 | E,1 | В,1 | | |
| | | В | Е,0 | - | - | - | | |
| | | C | F,0 | F,1 | - | - | | |
| | | D | - | - | B,1 | - | | |
| | | E | - | F,0 | A,0 | D,1 | | |
| | | F | C,0 | - | В,0 | C,1 | | |
| | b. | Explain the concept of sta | ate e | quival | ence | | | 6 |
| | | N | IOD | ULE - | 4 | | | |
| 7 | a. | Explain input independence and autonomous clock For the 10 | | | | | | 10 |
| - | | Machine M shown in Table 0.7(a) find input consistent partition | | | | | | |
| | | If the assignments are as follows, find the logical equation for the | | | | | | |
| | | machine. | | | | | | |
| | | Assignments : A - 000 | , В - | - 001, | C - 0 | 10, D | - 011, E - 100, | |
| | | F -101 | | , | | | . , | |
| | | Draw the realization of n | nach | ine M | using | g auto | nomous clock and | |
| | | draw the autonomous clo | ck o | f macl | nine M | [. | | |
| | | Table Q.7(a) | | | | | | |
| | | PS N | IS | | Z | | | |
| | | | ζ=Ο | X =1 | X=0 | X=1 | | |
| | | A |) | С | 0 | 1 | | |
| | | ВС | 2 | D | 0 | 0 | | |

| | | Г | Δ | 1 | | | | |
|------------|--|--|---|--|---|--|--|--|
| | | г | 0 | 1 | - | | | |
| | | Г | 0 | 0 | | | | |
| | | A | 0 | 1 | | | | |
| _ | F A | B | 0 | 0 | | | | |
| b. | What are Covers and implic | ation gr | aph? | Explai | n | 6 | | |
| OR | | | | | | | | |
| a. | For the machine M shown in Table Q.8(a), give the closed | | | | | | | |
| | partition by state splitting. Write the corresponding logical | | | | | | | |
| | equation and implication graph. | | | | | | | |
| | | | | | | | | |
| | Table Q.8(a) | | | | | | | |
| | PS NS | | Ζ | | | | | |
| | | | X=0 | X=1 | | | | |
| | X=(|) X=1 | | 21 I | | | | |
| | | R R | 0 | 1 | - | | | |
| | | B | 0 | 0 | | | | |
| | | | 0 | 0 | | | | |
| h | Write on evenleneters note of | n Doroll | | 0 | ition | 0 | | |
| D. | white an explanatory note on Parallel Decomposition | | | | | | | |
| MODULE - 5 | | | | | | | | |
| a. | What is an experiment? Explain types of experiments with | | | | | | | |
| | reference to fault detection. | | | | | | | |
| b. | Describe the concept of Machine Identification. | | | | | | | |
| с. | Write a note on diagnosable machines | | | | | | | |
| OR | | | | | | | | |
| a. | Explain Second algorithm | for t | he de | esign o | of fault detection | 6 | | |
| | experiments | | | | | | | |
| b. | Prove the theorem : If an n-state machine has a synchronizing or | | | | | | | |
| | sequences, then it has one such sequences whose length is at | | | | | | | |
| | most n(n+1)(n-1) / 6 | | | | | | | |
| | b. a. b. c. a. b. | CEDFEBFAb.What are Covers and implicationa.For the machine M show partition by state splitting equation and implication gradinga.For the machine M show partition by state splitting equation and implication gradingA.For the machine M show partition by state splitting equation and implication gradingb.For the machine M show partition by state splitting equation and implication gradingA.For the machine M show partition by state splitting equation and implication gradingb.Write an explanatory note or MOa.What is an experiment? reference to fault detection. b.b.Describe the concept of Mac c.c.Write a note on diagnosableCa.Explain Second algorithm experimentsb.Prove the theorem : If an n- sequences, then it has one most n(n+1)(n-1) / 6 | CEFDFFEBAFABb.What are Covers and implication graph.ORa.For the machine M shown in ' partition by state splitting. Wri equation and implication graph.Table Q.PSNSNSNSZ=0X=1AABBCBCACb.Write an explanatory note on Paral CMODULE -a.What is an experiment? Explain reference to fault detection.b.Describe the concept of Machine Id c.ORa.Explain Second algorithm for the experimentsb.Prove the theorem : If an n-state rn sequences, then it has one such most n(n+1)(n-1) / 6 | CEF0DFF0EBA0FAB0b.What are Covers and implication graph?ORa.For the machine M shown in Table partition by state splitting. Write th equation and implication graph.a.For the machine M shown in Table partition by state splitting. Write th equation and implication graph.PSNSZPSNSZImage: A state splitting in the partition of the state splitting in the partition of the state splitting in the partition of the state splitting in the state splitting in the partition of the state splitting in the partition of the state splitting in the state splitting is a splitting in the splitting is a splitting in the splitting is a splitting in the splitting is a s | $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | $ \begin{array}{ c c c c c c c } \hline C & E & F & 0 & 1 \\ \hline D & F & F & 0 & 0 \\ \hline E & B & A & 0 & 1 \\ \hline F & A & B & 0 & 0 \\ \hline \end{array} \\ \hline \rule{0mm}{3mm} \\ \hline \rule{0mm}{3mm} \\ \hline \end{array} \\ \hline \rule{0mm}{3mm} \\ \hline \rule{0mm}{3mm} \\ \hline \rule{0mm}{3mm} \\ \hline \rule{0mm}{3mm} \\ \hline \end{array} \\ \hline \rule{0mm}{3mm} \\ \hline \rule\\ \rule{0mm}{3mm} \\ \hline \rule{0mm}{3m$ | | |