

**International Islamic University Chittagong**  
**Department of Electrical and Electronic Engineering**

**Final Assessment Test Autumn-2020**

Program: B.Sc. Engg. (EEE)

Course Code: **EEE-2407**

Course Title: **Digital Electronics**

Time: **5 hours** (Writing **4 hours**  
**30 minutes** + **30 minutes**  
 submission time)

Full Marks: **50** (Written 30 + Viva/Viva-Quiz-20)

[Answer each of the questions (1-5) from the followings; Figures in the right margin indicate full marks.]

**SET-A**

- 1(a). Design** a circuit of octal to binary encoder with the following information. CO1    C            03
- (i) MNPQXY are the 1<sup>st</sup> to 6<sup>th</sup> digits of your student ID. If your first digit M is 1 then assume it as D<sub>1</sub>, similar explanation is true for other cases.
- (ii) Expression for output variables x, y and z are,  $x = M + N + P + Q$ ,  $y = N + P + Q + X$ ,  $z = P + Q + X + Y$ .
- 1(b). Implement** a Boolean function  $F(A,B,C) = \sum(M,N,X,Y)$  by multiplexer, where M, N, X and Y are the 3<sup>rd</sup> to 6<sup>th</sup> digits of your student ID, respectively. CO2    Ap            03
- 2(a). Develop** a full adder circuit using a decoder and two OR gates. Choose,  $S = \sum(M,N,X,Y)$  and  $C = \sum(P,Q,X,Y)$ , where, MNPQXY are the 1<sup>st</sup> to 6<sup>th</sup> digits of your student ID. CO3    C            03
- 2(b). Design** a combinational circuit by using PLA, where,  $F_1 = A'B + AC'$  and  $F_2 = AC + B'C$ . CO3    C            03
- 3(a). Explain** the stepwise logic diagram and timing relationship of master-slave flip-flop using RS flip-flop. CO1    C            03
- 3(b). Identify** the steps of state reduction process towards reducing the states of the following state diagram. CO2    An            03

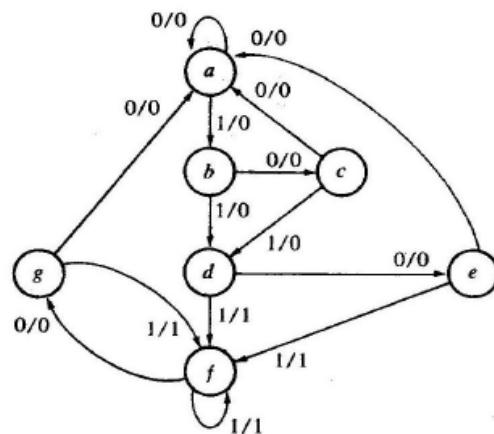


Fig. 3(b): State diagram

- 4(a). Design** a counter that has a repeated sequence of six states (starting CO3    C            03

- from 000 and end state is 110).
- 4(b).** Suppose,  $N = Y + 1$  is the number of flip-flop, where Y is the last digit of your student ID (If  $Y = 0$  with your student ID, at that case choose your 2<sup>nd</sup> last digit as Y, if both the last digits are 0, then choose  $Y = 2$ ). **Calculate** the mod number and design a mod counter with the calculated mod number using J-K flip-flop. **CO3 E 03**
- 5(a).** **Compare** among various types of data shifting process. **CO3 U 03**
- 5(b).** From your study, give your **comments** on the difference in construction and timing sequence of 4-bit and 5-bit Johnson counter. **CO3 An 03**
- 6.** Viva/Viva-Quiz: The time of viva/viva-quiz will be declared in google classroom. **CO1, U, 20**  
**CO2, An,**  
**CO3 Ap**