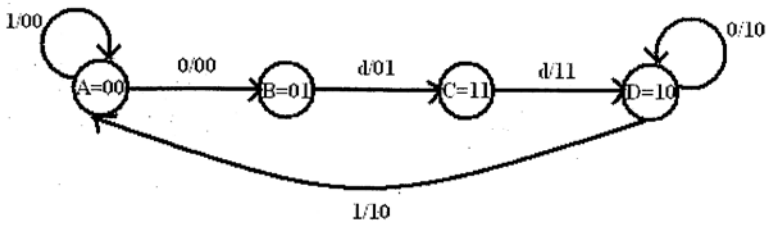
3. State diagram of a sequential machine is provided below where *d* stands for don't care. Obtain the state table for this sequential machine. Design a circuit using SR-FFs that will function as per the state diagram provided below. 3+7



4. a) What are the widths and direction of address bus and data bus of 8086 microprocessor?
   b) What are physical address and logical address? Illustrate with example how physical address can be calculated from logical address?
   c) Which registers can be used to specify logical address to access memory and how? 2+4+4
5. a) How 8086 microprocessor executes instructions sequentially?
   b) How many branching instructions are available in this microprocessor?
   c) Describe the syntax and operation of NEAR CALL and FAR CALL instructions. 2+3+5
6. a) Explain the syntax and operation of MUL and DIV instruction.
   b) Write a sequence of assembly language instructions to divide 34547 by 413 and specify where the results would be available. 6+4

Ex/PG/SC/CBS/PHY/TH/405/2022

M. Sc. Physics Examination, 2022

(2nd Year, 2nd Semester)

Advanced Electronic Circuit, Microprocessor and Microcontroller

Paper – 405

Time : Two hours Full Marks : 40

Answer ***any four*** questions.

1. a) Convert a D flip flop (FF) in to a JK FF.
   b) Show that an EXOR gate can be used as a phase detector and write down disadvantage of it. Explain how this disadvantage can be removed. Draw the block diagram of phase locked loop. 5+5
2. a) Show that a D FF can act in toggle mode.
   b) The circuit below comprises of D FFs. The output is taken from Q_3, Q_2, Q_1 and Q_0 as shown in the figure the binary number given by the string $Q_3Q_2Q_1Q_0$ changes for every clock pulse that is applied to the CLK input. If the output is initialized at 0000, find the corresponding sequence of decimal numbers generated by the circuit. 2+8