

Continuous Assessment Test(CAT) – I JANUARY 2026

Programme	: B. Tech. CSE and all specialization	Semester	: WINTER 2025-26
Course Code & Course Title	: BACSE103- Computation Structures	Class Number	: CH2025260500945, 0947, 0950, 0959, 0961, 0963, 0952, 0955, 2916, 2918, 2919, 3115
Faculty	: Dr. Christopher Columbus C, Dr. Vergin Raja Sarobin M, Dr. Shola Usha Rani, Dr. Vidhya Lakshmi M, Dr. Joshua Reddipogu, Dr. Khadar Nawas K, Dr. Chrishia Christudhas, Dr. Krithika alias AnbuDevi.M, Dr. Akash Kumar Pradhan, Dr. Upender P, Dr. P. Nirmala, Dr. R. Pugazhenth	Slot	: B1+TB1
Duration	: 1 ½ hours	Max. Mark	: 50

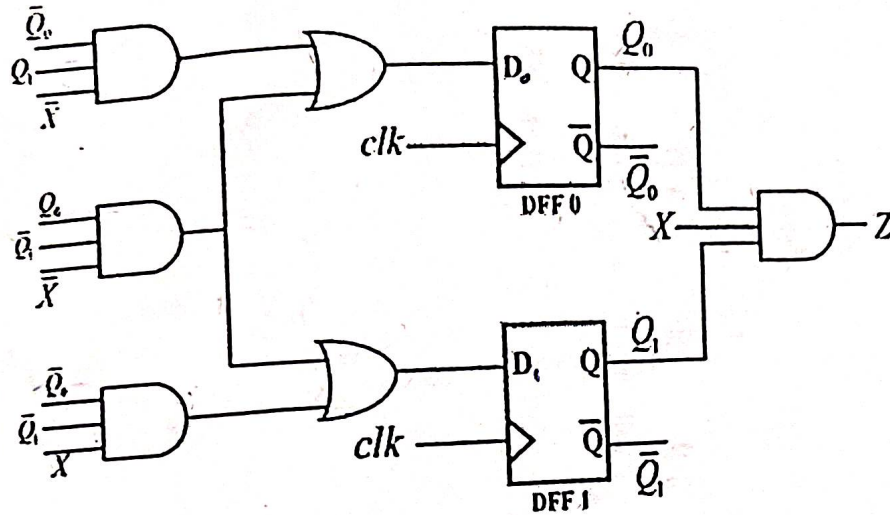
General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1		A digital control system in a transportation terminal processes data in different number formats for display. During a particular day, the average cargo carried by a person is estimated as 21.32 in decimal. The digital system then acquires an original diagnostic code $(421)_8$ and applies a correction value $(-137)_{10}$ with the original diagnostic code to obtain the corrected diagnostic code in decimal. a) Convert the given average cargo value into binary and <u>BCD</u>. (4 Marks) b) Find the decimal equivalent of the original diagnostic code. (2 Marks) c) Find the corrected diagnostic code using r's complement method. (2 Marks) d) Compute the corrected diagnostic code in binary format. (2 Marks)	10	1	K3
2		The centralized air conditioner in a corporate building is activated with four switches SW1, SW2, SW3, and SW4 which are operated in the following sequence. i) SW3=1, SW4=0, irrespective of other switches.	10	1	K1

ii) $SW1=SW3=0$, $SW4=1$, irrespective of other switch. iii) $SW2=SW3=SW4=1$, irrespective of other switch. iv) $SW1=SW4=1$, $SW2=0$, irrespective of other switch. a) Formulate the canonical Sum-of-Products (SOP) expression for the given application and obtain the simplified expression using K-map. (5 Marks) b) Realise the simplified expression using universal gates. (3 Marks) c) Explain the practical significance of the simplified logic. (2 Marks)			
Realize the following logic gates using 2:1 multiplexer having two data input lines, one selection line and one output line. (Each 2 Marks) a) NOT b) AND c) OR d) XOR e) XNOR	10	1	K6
An industrial control panel needs to control four machines (M1, M2, M3, M4) using a single control signal. There is one control signal line from the central controller. An operator uses two selection switches (S1 and S0) to select which machine to activate. The selected machine turns ON when the control signal is HIGH. All non-selected machines must stay OFF. a) Name the digital logic device required to implement this system. (1 Mark) b) For $S1S0 = 01$ and control signal = 1, identify which machine will be ON. (1 Mark) c) Draw the complete logic circuit implementation of this system using basic logic gates. Show how the control signal and selection lines are connected to produce the machine output signals. Label all inputs and outputs clearly. (3 Marks)	5	1	K2



For the above sequential circuit, determine the following:

- Identify the type of FSM (Mealy or Moore machine). Justify your answer. (2 Marks)
- Derive the circuit equations: (4 Marks)
 - Output equation for Z
 - Next-state equations for D1 and D0
- Construct the state table. (5 Marks)
- Draw the state diagram indicating all states and clearly labelling every state transition. (4 Marks)

*****All the best *****