

NATIONAL INSTITUTE OF TECHNOLOGY PATNA
Department of Electronics and Communication Engineering
MID-SEMESTER EXAMINATION

B.Tech.: Semester-I

Course Name: Digital Design

Maximum Time: 2 hours

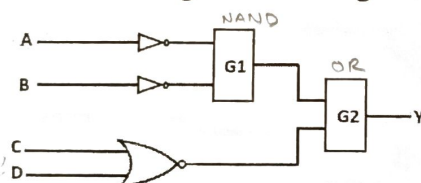
Course Code: EC14102

Max. Marks: 30

Instruction:

1. Attempt all questions.
2. Assume any suitable data, if necessary.
3. The Marks, CO (Course Outcome), and BL (Bloom's Level) related to questions are mentioned on the right-hand side margin.

- | | Marks | CO | BL |
|--|-------|-----|----|
| ✓ 1 Convert the following numbers with the indicated bases to the other indicated base | 5 | CO1 | U |
| a) $(101011000.11)_2 \rightarrow ()_{16}$ | | | |
| b) $(ECE)_{16} \rightarrow ()_8$ | | | |
| c) $(4021.2)_5 \rightarrow ()_{10}$ | | | |
| d) $(25)_{10} \rightarrow ()_4$ | | | |
| e) $(CAD)_{16} \rightarrow ()_2$ | | | |
| ✓ 2 Using Boolean notation, write an expression that is a 1 whenever one or more of its variables (A, B, C, and D) are 1s. $A+B+C+D$ | 2.5 | CO1 | U |
| ✓ 3 Simplify the given function $F = \prod m(0, 1, 2, 3, 4, 6, 10, 11, 13)$ to SOP and POS form. | 2.5 | CO1 | U |
| ✓ 4 Determine the gates G1 and G2 in the figure shown to get the output $Y = AB + \bar{C}\bar{D}$ | 2.5 | CO1 | A |



- | | | | |
|---|-----|-----|---|
| ✓ 5 A combination of inverters is shown in Figure 1(a). If the waveform in Figure 1(b) is applied to point A in Figure 1(a), determine the waveforms at points D. | 2.5 | CO1 | A |
|---|-----|-----|---|

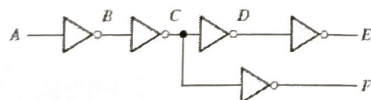


Figure 1(a)



Figure 1(b)

- | | | | |
|--|---|-----|---|
| ✓ 6 What are the limitations of the encoder? Design and explain the 8×4 priority encoder with a valid output. | 5 | CO2 | R |
| ✓ 7 Implement $f(A, B, C) = \sum m(1, 2, 4, 5, 7)$ using 4:1 MUX with A and C as a select line. | 5 | CO2 | U |
| ✓ 8 Derive the logic expression of SUM and CARRY for full adder circuit. Implement the full adder circuit by using half adder and OR gate. | 5 | CO2 | R |