



كلية تكنولوجيا الصناعة والطاقة

Information Technology Department  
2<sup>nd</sup> Year



جامعة برج العرب التكنولوجية  
BORG AL ARAB TECHNOLOGICAL UNIVERSITY

جامعة برج العرب التكنولوجية

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| <b>Course:</b> Digital Engineering<br><b>Semester:</b> 1 <sup>st</sup> term 2025/2026. | <b>Lecturers:</b> Dr. Osama Elnahas, Dr. Dina Abdelhafiz, Dr. Bassant Tolba, Dr. Radwa Rady<br><br><b>Assistant:</b> Eng. Rania Helal, Eng. Assma, Eng. Israa Mohsen, Eng. Hazem, Eng. Belal, |
| Sheet 2: Truth Tables                                                                  |                                                                                                                                                                                               |

**Question 1 — Write down the truth table for the following logic expression**

a)  $F = ((A + B)' \cdot (A + A'B'))'$

**Question 2 — Write down the truth table for the following word expressions:**

- a) Design a circuit with 3-bit input A, B, C that outputs  $f = 1$  if the binary number is even or  $=0$ , otherwise  $f = 0$ .
- b) Design a 3-bit input circuit A, B, C that outputs  $f = 1$  if the input presents powers of two (1,2,4,...) .

**Question 3: Find the Duals (dual of the inner expression X;  $+ \leftrightarrow \cdot$ ). Reminder: To form the dual  $F^d$  of an expression X, interchange + and  $\cdot$  everywhere. Complements and variables remain unchanged; constants  $0 \leftrightarrow 1$  if present.**

a)  $X = \overline{\overline{A(B + C)} + \overline{C} E \overline{D}}$

b)  $X = \overline{(\overline{ABCE}) \overline{C} (E + \overline{D})}$