CT-3

You need to be alert to (usually minor) changes that may be made to the assignment statement or to the guidelines after the assignment is first put up. Refresh this frame and re-read the assignment carefully before you make your final submission.

Q1

- Let $B = \{1, p, q, pq\}$, where p, q are distinct positive prime integers.
- Let $a + b$ be the LCM of a and b
- Let $a \cdot b$ be the GCD of a and b

Check whether $\langle B, +, \cdot \rangle$ is a Boolean algebra, establishing

i. which elements may play the role of 0 and 1,
ii. the possible existence of complements of the elements of B,
iii. whether $+$ distributes over $\cdot$ and
iv. whether $\cdot$ distributes over $+$

Q2

Using Shannon expansion prove that $ab + \bar{b}cd + acd = ab + \bar{b}cd$.

Q3

i. Define a three variable Boolean function $f(p, t, e) : \mathbb{B}^3 \rightarrow \mathbb{B}$ which is logically equivalent to the following C code:

```
if (p == 1) then
    return t;
else
    return e;
```

ii. Realise the majority function $M(a, b, c) = ab + ac + bc$ using that three variable function $f : \mathbb{B}^3 \rightarrow \mathbb{B}$.

Q4

Use the Quine-McClusky method to find the minimised sum of products expression for the function $F(a, b, c, d) = \sum_m(1, 5, 7, 8, 9, 13, 15) + \sum_d(4, 14)$

Marking guidelines

Assignment marking is to be done only **after** the deadline expires, as submissions gets blocked after the assignment is marked. Enter the breakup of marks while marking.

Q1	
No mistake (each item)	**2**
Otherwise (each item)	**0**
Full marks (all items)	**8**
Q2	
No mistakes	**8**
Few mistakes but sensible steps	**4**
Otherwise	**0**
Q3	
No mistake (each item)	**4**
Otherwise (each item)	**0**
Full marks (all items)	**8**
Q4	
No mistake (identifying prime implicants)	**8**
Few mistakes but sensible steps	**4**
Otherwise	**0**
No mistake (minimal covering)	**6**
Few mistakes but sensible steps	**2**
Otherwise	**0**
Total Marks	***40***

Submission

- Write neatly on a piece of paper and upload PDF.
- Provision of uploading plain text file is also available.

Use electronic submission via the WBCM link

You should keep submitting your incomplete assignment from time to time after making some progress, as you can submit any number of times before the deadline expires. **You should submit all your files together**.

Warning

Cases of copying will be dealt with seriously and severely, with recommendation to the Dean to de-register the student from the course.