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**F.Y.B.Sc. (Computer Science) EXAMINATION, 2018**

**ELECTRONIC SCIENCE**

**Paper-II**

**ELC-102 : Principles of Digital Electronics**

**(2013 PATTERN)**

**Time : Three Hours**

**Maximum Marks : 80**

**N.B. :—** (i) All questions are compulsory.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

1. Attempt all of the following : [8×2=16]
- (a) Express  $(-32)_{10}$  in 8-bit signed magnitude form.
  - (b) Simplify the expression  $Y = A \cdot (A + B)$ .
  - (c) What will be the addition of the following numbers :  
1101.01, 0101.10
  - (d) For a demultiplexer having 64 outputs, find the number of control lines required.
  - (e) Mention any *two* applications of shift registers.
  - (f) Draw the symbol of tristate inverter and write its truth table.
  - (g) Differentiate between encoder and decoder.
  - (h) Find the time required to load 8-bit data serially in a register if the duration of clock pulse is 10  $\mu$ sec.

P.T.O.

2. Attempt any *four* of the following : [4×4=16]
- (a) Convert the following :
    - (i)  $(10110)_2 = (?)_{10}$
    - (ii)  $(181)_{10} = (?)_{16}$
  - (b) Convert the given expression into standard SoP form :  
$$Y = \bar{A}B + BC + C\bar{A}$$
  - (c) Draw the logic diagram and give the truth table for :
    - (i) Half Adder
    - (ii) Half Subtractor.
  - (d) Explain the working of 4 : 1 multiplexer using AND-OR gates.
  - (e) With a neat logic diagram explain the working of clocked R-S flip-flop.
  - (f) With suitable diagram explain the working of TTL NOT gate.

3. Attempt any *four* of the following : [4×4=16]
- (a) Draw the symbol and give the truth table for :
    - (i) 2-input AND gate
    - (ii) 2-input OR gate.
  - (b) Construct NOR gate and NOT gate using NAND gates.
  - (c) Explain the working of 4-bit parallel adder with the help of a neat diagram.
  - (d) Draw the logic diagram for decimal to binary converter and explain its working.
  - (e) Show the connections of IC 7490 for mod-4 and mod-7 operation.
  - (f) Define the parameters for logic gates :
    - (i) Propagation delay
    - (ii) Fan-out
    - (iii) Logic levels
    - (iv) Noise margin.

4. Attempt any *four* of the following : [4×4=16]

- (a) Explain the concept of '+ve logic' and '-ve logic' in case of logic gates.
- (b) Simplify the given expression using *k* map. Draw the simplified diagram :

$$Y = \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + ABC$$

- (c) With a neat block diagram explain the working of 1-bit comparator.
- (d) Draw the block diagram of BCD to 7 segment conversion. For the BCD inputs 2 and 8, what will be the 7 segment outputs ? Assume the display to be of common anode type.
- (e) With the help of neat logic diagram explain the working of 3-bit serial-in-serial out right shift operation.
- (f) Write a note on logic families.

5. Attempt any *two* of the following : [2×8=16]

- (a) (i) Explain the working of 3-bit parity generator circuit with suitable diagram.  
(ii) Subtract  $(43)_{10}$  from  $(81)_{10}$  using 2's complement method.
- (b) Explain the working of 3-bit asynchronous up counter with suitable logic diagram. Draw the timing diagram for the same.
- (c) (i) State and prove De-Morgan's theorems.  
(ii) Explain the process of key identification in case of 3×4 keyboard matrix encoder.