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F.Y.B.Sc. (Computer Science) EXAMINATION, 2017

ELECTRONICS SCIENCE

Paper II

ELE-102 : Principles of Digital Electronics

(2013 PATTERN)

Time : Three Hours   Maximum Marks : 80

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

(*ii*) Neat diagram must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

1. Attempt all of the following :   [8×2=16]

(*a*) Differentiate between weighted and unweighted code.

(*b*) Define the term minterm.

(*c*) Draw the logic diagram for half adder.

(*d*) For a decoder having 32 states what will be the number of control lines required.

(*e*) Mention why synchronous counters are faster than asynchronous counters.

(*f*) Draw the symbol of a tristate inverter and give its truth table.

(*g*) Differentiate between encoder and decoder.

(*h*) What is a ring counter ?

P.T.O.

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

(*a*) Perform the following :

 (*i*) $(11101)_{Gray} = (?)_2$

 (*ii*) $(479)_{10} = (?)_{BCD}$

(*b*) Simplify the given expression using rules of boolean algebra :

$$Y = (\overline{A} + B + C)(A + \overline{B} + C)$$

(*c*) With a neat logic diagram explain the working of a full subtractor.

(*d*) Explain the working of 4 : 1 multiplexer using NAND gates.

(*e*) Show the connections required to convert JK Flip-Flop to D Flip Flop and T Flip-Flop. Write the truth table for the same.

(*f*) With suitable diagram explain the working of CMOS 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 NAND gate and NOT gate using NOR gates.

(c) With neat diagram explain the working of 4-bit universal adder-subtractor.

(d) Draw logic diagram for Hex to Binary conversion.

(e) Show the connections of IC7490 for MOD 7 and MOD 3 operation.

(f) Define the parameters for a logic family :

    (i) Fan in

    (ii) Switching speed

    (iii) Logic levels

    (iv) Propagation delay.

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

(a) Write a short note on Alphanumeric codes.

(b) Simplify the given expression using K-map. Draw the simplified diagram :

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

(c) Explain with block diagram the working of ALU.

(d) What are the different types of 7 segment displays ? Explain the working of each type.

(e) With neat logic diagram explain the working of 3-bit parallel in parallel out shift register.

(f) Write a short note on logic families.

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

    (*a*) (*i*)   Explain the working of 3-bit parity generator with suitable diagram.

          (*ii*) Perform $(45)_{10} - (23)_{10}$ using 2's complement method.

    (*b*) Explain the working of 3-bit synchronous up counter with suitable logic diagram. Draw the timing diagram for the same.

    (*c*) (*i*)   With neat diagram explain the working of 3×4 matrix keyboard encoder.

          (*ii*) State and prove the De-Morgan's theorems.