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S.E. (Information Technology) (Sem-III) (Revised Course 2016-2017)
EXAMINATION MAY/JUNE 2019
Analog And Digital Circuits

[Duration : 3 Hours]

[Max. Marks : 100]

Instructions:

- 1) Answer **any 5** questions with at least **two** from Part-A, **two** from Part-B and **one** from Part-C
- 2) Make **necessary** assumptions **wherever** required
- 3) Draw **neatly** labeled diagrams **wherever** necessary

PART - A

- Q.1
- a) Draw and explain the function of a full Adder using Truth Table. 04
 - b) Tom and his three friends, Alice, Bob, and Charlie have been invited to a party. But Tom is an introvert and will only go if only a single one of his friends also goes. Express this as a logic function 07
 - c) Draw and explain 4 bit ripple carry adder 06
 - d) Add -25_{10} to 18_{10} using binary addition [Hint: use 2's Complement to represent -25] 03
- Q.2
- a) Solve using K-maps the following function; 06

$$F(A, B, C) = \sum m (\bar{A}BC + A\bar{B}\bar{C} + ABC + ABC\bar{C})$$
 - b) Define the following term with its Block diagram and give one use of it. 08
 - i) Multiplexer (8×1)
 - ii) Encoder ($4:2$)
 - c) Design a basic BCD to decimal decoder 06
- Q.3
- a) Show how 1-to-4 Demultiplexer can easily be built from 1-to-2 Demultiplexer 08
 - b) Explain with a neat diagram and truth table JK Master Slave Flip flop 06
 - c) With a neat diagram, Explain 555 Astable Multivibrator 06

PART - B

- Q.4
- a) A 5-bit weighted Register D/A converter has input voltage $V_{high} = 10V$ and $V_{low} = 0V$. The feedback resistor is $16K\Omega$ and resistor corresponding to LSB is $8K\Omega$ 06
 - i) Calculate all resistors
 - ii) Calculate output when input is 1011
 - b) Design and explain Mod -10 shift counter with its output waveform 06
 - c) Describe the 4-bit Serial-in to Parallel-out Shift Register 08

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| Q.5 | a) How Op-amp can be used as an Adder, Subtractor and Comparator? | 09 |
| | b) Explain the following terms with respect to op-amp | 06 |
| | i) Slew rate | |
| | ii) CMRR | |
| | c) Compare merits/demerits of inverting and non-inverting amplifiers | 05 |
| Q.6 | a) Draw and explain Hartley and Colpits' oscillator with its applications. | 08 |
| | b) Draw and explain Serial-in, parallel-out shift register with 4-stages. | 08 |
| | c) State and explain four applications of Voltage Regulator | 04 |

PART – C

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|-----|--|----|
| Q.7 | a) Describe De' Morgan's Theorem | 04 |
| | b) Express the following in its 2's complement representation -80_{10} & 76_{10} | 08 |
| | c) With a neat diagram explain D-Flip Flop | 08 |
| Q.8 | a) Depict how together, ADC & DAC can be used in digital systems to provide a complete interface given an analog signal at the input to obtain analog at the output. | 07 |
| | b) Design a low voltage regulator using IC 723 | 07 |
| | c) Give principal of Piezoelectric crystal with its use in Oscillator. | 06 |