CLASS: M.TECH & PRE-PH.D.   SEMESTER : II/NA
BRANCH: EEE   SESSION : SP/19

SUBJECT: EE561 EMBEDDED CONTROL OF SWITCHING POWER CONVERTER
TIME: 3.00 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. **The question paper contains 5 questions each of 10 marks and total 50 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**

Q.1(a)   Differentiate between linear power supply and switched mode power supply based upon operating point.   [5]

Q.1(b)   Express a generalized large signal state space model in terms of small signal state space model and steady state space model using 1st order linearization.   [5]

Q.2(a)   Obtain small signal model of a Buck converter.   [5]

Q.2(b)   Obtain transfer functions relationship between small signal change in output voltage $(\hat{V}_C)$ and small signal change input duty cycle $(\hat{d})$ in case of Buck Converter.   [5]

Q.3(a)   Obtain transfer functions relationship between small signal change in inductor current $(\hat{i}_L)$ signal change input duty cycle $(\hat{d})$ in case of Boost Converter.   [5]

Q.3(b)   Obtain transfer functions relationship between small signal change in inductor current $(\hat{i}_L)$ signal change input voltage $(\hat{V}_g)$ in case of Boost Converter.   [5]

Q.4(a)   Calculate the time of bounding vectors in sector 2 that must be maintained in order to have carrier vector for 100Microseconds with 80% of DC bus utilization factor (k). Carrier vector is at π/6 radians.   [5]

Q.4(b)   Obtain the value of notch angles in order to eliminate 5th and 7th Harmonics from multiple pulse Square wave PWM using Newton-Cotes algorithm.   [5]

Q.5(a)   Write a program for ATMEGA2560 microcontroller to produce two pulses of 10kHz with 50% duty cycle in same phase using TIMER1.   [5]

Q.5(b)   Obtain describing function of Saturation type non linearity. Discuss its effect on response for Square wave input.   [5]

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