Reg. No.



VII SEMESTER B. TECH (ELECTRICAL & ELECTRONICS ENGINEERING) MAKEUP EXAMINATIONS, DECEMBER 2022

MODERN POWER CONVERTERS [ELE 4085]

REVISED CREDIT SYSTEM

Time:	3 Hours	Date: 31 December 2022	Max. Marks: 50								
Instructions to Candidates:											
	 Answer ALL the question: 	S.									
	 Missing data may be suita 	bly assumed.									
1A.	Make a technical compa mode power supplies.	arison between linear power supplies and su	witched (02)								
1B.	A buck converter has a and a load that varies be by load is 20 V with all 100 kHz, Design system every operating possibil	n input voltage that varies between 50 ar etween 75 and 125 W. The output voltage re owable ripple of 1%. For a switching frequ n components to provide for continuous cur lity.	nd 60 V equired ency of rent for								
			(04)								
1C.	With the help of neat voltage and minimum converter is having ou Analyze inductor voltag	circuit diagram derive the expression for value of inductance of a dc-dc converte utput voltage is greater than the input v e, inductor current and capacitor current.	output er. The oltage. (04)								
2A.	A push –pull converter is 0.45, the operating sv to 10Ω . Determine (a) (maximum secondary contraction of the secondary contraction of the secondary contraction)	has source voltage is 100V, N1:N2=8. Du vitching frequency is 150kHz and load is cor Output Voltage (b) maximum primary curre urrent (c) Analyze the waveform of the y circuit.	ty ratio nnected ent and e diode (04)								
2B.	A SEPIC circuit has an 12 V. The load resistand Determine values of <i>L</i> 1 is 40 percent of the ave	input voltage of 30 V and is to have an ouce is 2Ω , and the switching frequency is 25 and L2 such that the variation in inductor grage value.	itput of 50 kHz. current <i>(03)</i>								
2C.	The fly-back converter and output is 24V. T frequency is 200kHz, t range of duty ratio and required for the design.	is having input voltage is varying from 6 The turns ratio is N2/N1 = 3 assume switche load is having 10 Ω . Determine the op maximum voltage rating of the switch and	/ to 9V vitching erating d diode <i>(04)</i>								
	-										
3A.	Explain the role of terti derive an expression f inductor current and cu	ary winding in case of Forward converter. For the duty ratio D. Analyze the magr rrent through the filter inductor.	Hence, netizing (04)								
3B.	Analyze the waveform on a Class E resonant dc-d switch voltage reaches the second	of switch current, voltage and capacitor cur c converter. The mode of operation occurs zero with a negative slope.	rent of the <i>(04)</i>								



5B.

3C.

4B.

4C.

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shown in the Fig. Q.no. 5A. The switching frequency is 50KHz. Refer the core characteristics in Table 1.

Develop a small signal AC model of the buck boost converter in to canonical form

Req=50Ω Fig.Q.no.4C

 $\gamma\gamma\gamma\gamma$

 $L_r = 10 \mu H$ $C_r = 2\mu F$ ±100V



Classify the different soft switching techniques that can be

conduction mode with $\frac{ws}{w0}$ = 1.2. The equivalent circuit of the converter is

A series loaded resonant dc-dc converter operates in continuous

developed to enhance the efficiency of the converters.

given Fig. Q.no.4C. Calculate the peak inductor current.

(04)

(02)



(02)

Design an inductor and calculate area product for a buck converter is 5A.

L Io=5A D Vo= 10V С_ 16V ±10% Fig. Q.no.5A

(04)

(04)

(03)



5C. With the help of neat diagram, explain a negative feedback control switching regulator system for DC- DC buck converter.

(03)

Table 1: Physical Electrical and Magnetic characteristic of ferrite core

Core	Mean Length(mm)	Mean Magnetic length lm(mm0	Core cross- section (Ac*100mm2	Window area (Aw*100mm2)	Area Product (Ap*10^4 mm2	Effective relative permeability μr ± 25%	AL nh/TURNS ² ± ^{25%}
P18/11	35.6	26	0.43	0.266	0.114	1480	3122
P 26/16	52	37.5	0.94	0.53	0.498	1670	5247
P30/19	60	45.2	1.36	0.747	1.016	1760	6703
P36/22	73	53.2	2.01	1.01	2.010	2030	9500
P42/29	86	68.6	2.64	1.81	4.778	2120	10250
P66/56	130	123	7.15	5.18	37.03		