Menoufiya University
Faculty of Engineering
Shebin El-Kom
Final Exam
Academic Year: 2016-2017

Minufiya University

... Department: Electrical Engineering.
Year: Master.
Subject/Code: Design of power electronics circuits
Time Allowed: 3 hours
Date: 8 / 6 / 2017

Remarks: No. of pages: 2 No. of questions: 4 Allowed Tables and Charts: *(None)*
Assume any required data

Answer the following Questions [120Mark] (أجب عن الأسئلة التالية 100 درجة)

Question (1) *(20Marks)* **Marks**

[a]	Compare between power electronics controlled switches Thyristor, GTO, BJT, MOSFET and IGBT from point of view basic of operation, Ratings, switching frequency, commutation and best applications.	[7]
[b]	Design the boost converter shown in Fig.2, if the load voltage is 50 volt and the input voltage 25 Volt. Assume the load power Is 1 Kw, the switching frequency is 10 Khz, the ripple current either at the load terminals or supply terminals is 20 % of rated load current at load and 15 % at supply terminals. The voltage ripple is 10 % of load voltage at the load terminals and 5% at of Supply voltage at the supply terminals. Determine : - The value of inductance L . - The value of capacitors Cin , Co - Choose the controlled switches ratings.	[13]

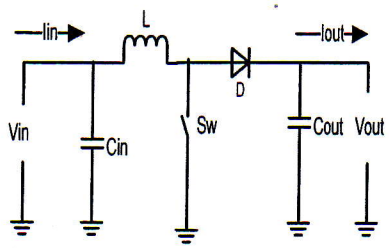


Fig.1

Question (2) *(25Marks)* **Marks**

[a]	Discuss briefly the advantages and disadvantages of both cyclo- converter and DC link?	[5]
[b]	A single – phase to single phase cyclo-conerter is supplying an inductive loads consists of resistance of 50 Ω, and an inductance of 40 mH, from 230 V , 50 HZ single phase supply. It is required to provide an output with 1/3 of input frequency. If the converters are operated as semi-converter such as $0 \leq \alpha \leq \pi$, assume the required output voltage is 101.6 Volt. Neglect the harmonics content of load voltage, determine: - Firing delay angle α_P of the cyclo- converter, - Choose the ratings of controlled switches - Input power factor.	[20]

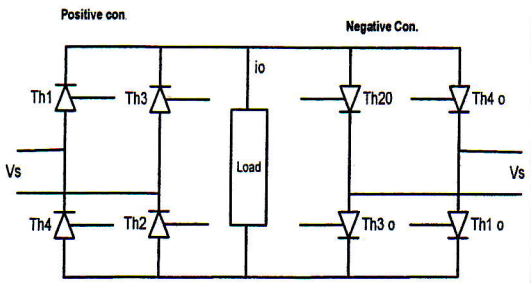
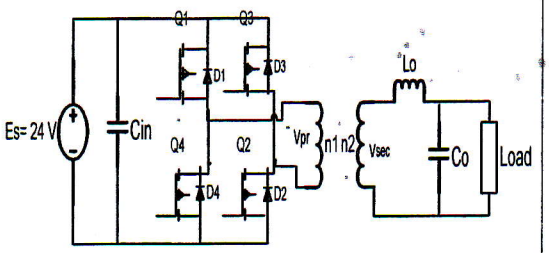
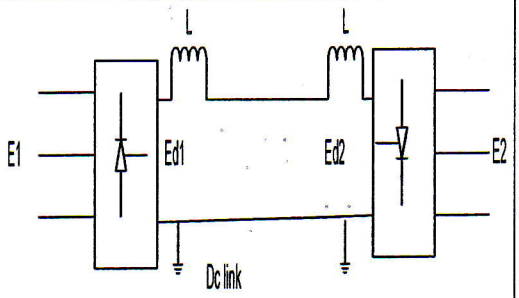


Fig. 2

Question (3) *(25Marks)* Marks

[a]	A single phase inverter shown in fig. 3, feed 1 Kw load with load power factor 0.85 at 220 volt and 50 hz . A solar panel charge battery used as supply with Es = 24 V to be as the inverter source. Assume the ripple current either at the load terminals or source is 25 % of the load rated current, the ripple voltage at the load terminals is 10 % load rated voltage , at the source terminals is 5 % of rated the source voltage. Consider the transformer efficiency is 80 % , turn on time of all switches is 0.01 second , forward resistance of each switch is 0.01 Ω . Design the inverter circuit and determine: - the value of Lo , Co , Cin - over all the system efficiency - choose the controlled switches and diodes	 Fig. 3	[25]

Question (4) *(30Marks)* Marks

[a]	Discus the fault finding procedure in power electronic circuits and fault clearance steps for each section of the circuit?		[10]
[b]	A dc transmission line operating at 150 KV carries a current of 400 A. Calculate the approximate value of the following: - The AC line voltage at each converter station. - The AC line current -The active power absorbed by the rectifier - the reactive power absorbed by each converter. Assume the rectifier firing angle α is 25^0 and Advance angle of The inverter β is 35^0 (take six pulse converter and Ed = 1.35 E1 cos α)	 Fig 4.	[20]

انتهت الأسئلة مع أطيب الأمنيات بالتوفيق

أ.د / عوض السيد السبع واللجنة

Field	National Academic Reference Standard(NARS)								
	Knowledge & Understanding				Intellectual Skills	Professional Skills			General Skills
Course ILOs	a-4-1	a-8-1	a-8-2	a-19-1	b-2-1	c-13-1	c-13-2	c-17-1	-----
Question No.	1(a), 3(b)	1(b), 3(a),	1(b), 2(a,b), 4(a,b),	2(a), 3(a),	3(a),	1(b), 2(a),	3(b,c),	2(a), 3(a), 4(b),	------